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AUGUST 6, 1887.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXII. REGULAR EDITION NO. 606.

ARCHITECTVRE

ENGINEERING

DECORATION

CONSTRVCTION

TICKNOR & COMPANY

BOSTON MASS.

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(Gelatine Print issued only with Imperial Edition.)
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Puritan Congregational Church, Wilkes-Barre, Pa.
Passenger Station, Rochester, N. Y.
House, Chelsea, Mass.
House at Manchester, Pa.
Church of St Pierre, Auxerre, France.

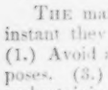
REVIEW OF THE PRINCIPLES OF SANITARY PLUMBING AS NOW ACCEPTED BY ALL LEADING SANITARIANS.

THE main object to be attained is the complete removal of waste matters from the premises the instant they are generated. This can only be accomplished by observing the following rules:—(1.) Avoid all cesspools. (2.) Make all waste-passages as small as possible to effect their purposes. (3.) Construct every fixture on the principle of the flush-tank. (4.) Make every trap seal-retaining and self-scouring. (5.) Make all joints tight. (6.) Select the simplest appliances and the simplest system consistent with safety. These rules are self-evident enough to be accepted as plumbing axioms, and are sufficient to produce perfect work. The "Sanitas" Appliances have been constructed with a view to their fulfilment in every respect, and an examination of the steps leading to the development of these appliances will best illustrate the principles of Sanitary Plumbing, showing the faults which should be avoided, and the objects which should be sought.

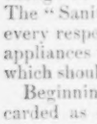
Beginning with the trap: In the first place mechanical seals have been discarded as being unreliable, unnecessary, and as obstructing the water-way. We start with the simplest form of water-seal trap, the ordinary S-trap. This

trap answers all our requirements except that it has no power to retain its seal under the variations of atmospheric pressure occuring within the waste-pipes. To remedy this deficiency the pot-trap was developed from the S-trap by simply enlarging its upcast limb, a sufficient enlargement gives it a temporary power of resistance, but creates a cesspool having no self-cleansing power

and, accordingly, the trap clogs, under sinks, with grease and ultimately loses its original resisting power. To avoid this difficulty we have turned the pot-trap on its side and reduced the size of its body. This permits the air to pass through the trap above the water without driving the latter out



before it, as would be the case with a perpendicular body equally reduced in diameter. To still further increase the power of resistance to siphonage the body was next bent into a quadrangle, giving several reflecting surfaces, which throw back this water under siphoning action while they allow the air to escape, and, finally, the two parallel sides of the quadrangle were merged into a single body having a reflecting partition and a large clean-out cap. This gives us the perfected Sanitas-Trap, which



has proved itself to be both anti-siphonic in properly arranged plumbing-work and substantially self-cleansing either with or without venting. It is more resisting than a vented S-trap.

The Sanitas is a Scientific System of Plumbing, having Simplicity and Safety for its Basis. It is also by far the most Economical System

SANITAS

APPLIANCES

PLUMBING

Avoid Infringements and Imitations which are described as being "as good as the 'Sanitas;'" they are not, they are very inferior as well as illegal.

Considering next the Lavatory. These should always be constructed on the principle of the flush-tank, their discharges filling the water-passages "full-bore," so as to keep them clean. The overflow and outlet passages should be combined in the form of a stand-pipe, thus doing away with the usual foul, inaccessible and badly jointed lead overflow-pipe, and the troublesome and dirty plug and chain. The stand-pipe should be operated by a simple mechanism above the slab, for convenience and cleanliness, requiring but a single movement of the hand, and all parts should be of solid and durable construction, while the stand-pipe should be easily detachable for cleansing. The Sanitas Lavatories are all constructed after this principle, and they are the first ever so constructed. The stand-pipes are made of either plated metal or of earthenware, like the fixture itself, and the whole device produces a very ornamental effect, especially when decorated in colors to correspond with the decoration of the earthenware bowl. Finally, the ideal water-closet should have the simplicity of the short-hopper, with the sanitary advantages and convenience of the improved modern closets. More than this, it should be practically noiseless, anti-siphonic, quick-acting, self-sealing, and free from spattering or waste of water. These desiderata have been attained in the Sanitas Water-Closet of which we sketch the outline in section. The supply-pipe between the cistern and the closet discharges into the latter below the level of its standing water, and being without air-pipe, stands permanently full of water, hence the action is instantaneous and the noise of flushing is deadened. This and the peculiar construction of the flushing-rim and water-supply passages cause the waste to be discharged with wonderful speed and effectiveness; and at the same time so quietly that with the cover down and the toilet-room door closed, no sound of flushing can be heard from without. The closet is highly ornamental in appearance, hence no other wood-work is required than the seat and cover, and these may be supported directly on the earthenware itself, which is constructed with this in view. The Sanitas System, taken together, is the most economical as well as the only safe system of plumbing, as avoiding the dangers and complication of special trap venting. Whether vented or not it is now admitted that safety requires a trap to be *anti-siphonic*, the vent-pipe alone not being reliable. The Sanitas Trap holds sufficient water to resist, when properly set, any *back pressure* that can occur in good plumbing with properly vented soil-pipes. For more detailed description and illustration of the Sanitas Appliances, see our other Advertisements and the Circulars of

THE SANITAS MANUFACTURING CO., BOSTON.

T. H. DUGGAN, 141 Dartmouth Street, BOSTON, MASS. TELEPHONE 4165 Will execute anywhere, in first-class manner, small or large contracts for **PLUMBING.**

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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WE have been asked to say something about the competition for the soldiers' monument in Indianapolis, which is to be decided in December next. The programme of conditions for competitors is not yet ready, so that we do not feel the disinclination to meddle in the matter with which we regard competitions in which the programme has once been published, and cannot, therefore, be changed without a violation of the contract made with persons who have accepted the conditions; and, moreover, the President and Secretary of the Commissioners show, in their letter to us, such an earnest desire to get a real work of art with the large appropriation made by the State, and so sincere a disposition to treat fairly and courteously the persons who accept their invitation, that, although we believe that they are to be sadly disappointed, we can do no less than explain our reasons for thinking so.

THE preliminary circular sent out by the Commissioners, although it contains only an outline of the conditions offered to competitors, shows plainly that some, at least, of the terms on which the State proposes to invite designs are such as no architect of reputation is likely to accept. The limit of cost is placed at the very liberal sum of two hundred and twenty thousand dollars, which, expended under the care of a first-rate artist, might secure for Indianapolis one of the noblest monuments in the world — a work which would attract strangers from long distances, and give the city a name throughout all civilization. In accomplishing this result, however, the first-rate artist is indispensable. From a second-rate man nothing but second-rate work of this kind can ever come, though he should toil day and night till doomsday; and from the cheap man, the enterprising person, the clever politician, the genteel lobbyist, or the rest of the crew that hustle each other after public employment, Indianapolis will get, instead of a work of art, an object which will appear every year more stupid and ridiculous, and will in some degree deaden and degrade the perceptions of all who look at it. It ought not to be necessary to insist upon this point, which every one comprehends who can see the difference between a statue and a tobacconist's image, and one would suppose that the people of the State of Indiana, in providing for the greatest work of art which will probably ever be erected there by public money, would have made sure of the employment of at least a tolerable second-rate artist by offering, as some compensation for the risk and expense of scrambling for the commission, the assurance that the best scrambler should be employed at the rate of pay usually accepted in civilized countries. This would be, for work of the kind, ten per cent on the cost, or twenty-two thousand dollars for designing and superintending the erection of the monument, with extra allowance for travelling expenses. First-class men, who do not need to scramble after jobs, would not be in the least attracted by the offer of this amount, or even of a much larger one, but it would be possible to excite even their interest by arranging the competition so that they might have the prospect of professional honor before them. He is a poor artist who does not like sometimes to measure his strength with his fellows, and to do his best to win the applause of men whose opinion he respects and values, and friendly emulation will lead men of artistic temperament to efforts which no offer of money would induce them to make.

THE Commissioners say that they "wish to imbue the work with the dignity of true art," and under such circumstances, although the best way to get what they wish would undoubtedly be to engage at once an architect and a sculptor of the highest reputation to make them the most beautiful monument which they were capable of doing for the money, the next best thing, in case they were hampered, as we suppose they were, by the common idea that the appearance of favoritism must be avoided by opening public work to all mankind, would have been to take great pains to make their competition a memorable event in the artistic world. It would have been well to offer a little more than the usual fee to the successful competitor, and the money could not have been better laid out; but much more important than this would have been the selection of a jury of the highest distinction. It would not have been necessary to multiply jurors; the decision of one man would be enough, but it is indispensable that he should be an architect or sculptor of world-wide reputation, such as Bartholdi, or Falguière, or Charles Garnier, or Ginain, among the French, or Alfred Waterhouse, or Norman Shaw, or a dozen others among the English. The idea of appearing before such men, of showing them what Americans can do, of profiting by their criticism, and, perhaps, of winning their applause, would be very attractive to our best artists, and if time enough were given them for the proper study of their design, many would, we venture to say, participate in the contest. We hoped, on reading the Commissioners' letter, that something of this sort was intended, but, although we learn that a good deal of discretion is given to the Commissioners in carrying out the affair, and therefore wish to speak with reserve, it must be acknowledged that the indications given in the preliminary circular point to anything but such a contest as we supposed. The most important matter is, of course, the composition of the jury, and we are told that this will consist of three members, an architect, a builder, and a civil engineer. That the Commissioners should wish to have an engineer represented on the jury is perhaps not unnatural, as there will be a certain amount of grading to be done about the structure, but the presence of a builder among the judges we cannot so easily account for. It is quite possible that the builders of Indiana may have had the advantage of artistic training, and are peculiarly sensitive to unity of design, silhouette, and breadth of modelling, but they are not so anywhere else, and their services in most places on a jury to consider a work of architecture and sculpture would be just as valuable as those of a frame-maker in judging of pictures. The third member is, indeed, to be an architect, and we do not doubt that the Commissioners will do their best to select a good one, but it is needless to say that not a single architect or sculptor, capable of doing the city of Indianapolis any real credit, will submit his work to the award of a jury so composed. We imagine that an invitation on the part of an agricultural society to the Western raisers of fancy live-stock to send their beautiful cattle and horses to be judged by a sailor, a sausage-maker and a farmer would not meet with much response, and it would not add to the attractiveness of the invitation to have it understood that all the animals, with the possible exception of one or two, would be killed on arrival, and the hoofs and horns only returned at the owners' expense. Indeed, to assimilate this agricultural competition to that presented to architects, as we read the preliminary circular, it would be necessary to announce that all the cattle and horses sent would be immediately confiscated by the management, but that if the interesting jury found good eating in any of them, it might possibly keep the remains and reward the owners by a "premium" of two dollars for the most toothsome specimen and one dollar for the next best.

THESE magnificent equivalents for a thorough-bred horse, or a Jersey cow, are pretty well proportioned to the rewards which the circular appears to offer to the architects who win the suffrages of the builder and the engineer, whether the architect on the jury agrees with them or not. As we read, a premium of one thousand dollars is offered for the best design, and one of five hundred for the next in merit; but nothing is said about employing the successful competitor at the usual Commission to carry out his design; on the contrary, it is expressly stipulated that the Commissioners reserve the right to reject all the designs, and that none are to receive premiums unless adopted. As it would be a poor set of competition drawings, and a still worse model, which did not cost the author at least a thousand dollars, it may be imagined how enthusiastically the members of the profession will rush to expend their hard-earned money on work for which they may possibly have a chance to receive back a portion of what the work cost them. With any architect of professional reputation it would be a very small portion. We have often known architects spend four or five thousand dollars on a set of competition drawings, and have known one thousand paid for a single pen-and-ink perspective, and five hundred for a very indifferent model, and, as architects' offices go, it would be impossible to give a design for such a building the necessary study, or to show it in creditable style, without spending far more than the amount of the highest premium; but the Indiana circular, not content with this, demands that competitors shall accompany their designs with minute and detailed bills of quantities, carried out with estimates. We presume that the authors of the circular do not know that the usual, and in England the legal compensation for making a bill of quantities from drawings, without estimates, is two-and-one-half per cent on the proposed cost, or, in this case, fifty-five hundred dollars for the quantities only, while the time and trouble required for making reliable estimates on anything so difficult as monumental work would be worth at least half as much more, or about eight thousand dollars for the proper and conscientious fulfilment of this condition alone. The Commissioners can judge how many reliable estimates they are likely to receive under these circumstances, or how valuable those are likely to be which they do receive, if any should be sent. Architects know well enough, if Commissioners do not, that bills of imaginary quantities, priced with a plausible approximation to correctness, form about the best means of getting building-committees into trouble that have yet been devised; and, in the hands of persons willing to deceive, give unlimited opportunity for successful fraud; yet under the Commissioners' circular nothing better can possibly be expected. They are likely, however, to be as good as the designs which accompany them; and, much as we would like to speak more favorably of an honest effort, we cannot see the least prospect that the invitation, unless radically modified, will bring, for the benefit of the great State of Indiana, anything better than a lot of compositions by stone-cutters' and granite-dealers' young men, with, perhaps, a few extraordinary efforts from recent pupils of the evening drawing-schools, accompanied by specifications of which the less said the better, and by quantities and estimates beneath contempt. It is impossible to believe that the people of Indiana really want professional service of that kind. They have appropriated a very large sum of money for a monument, and they cannot be willing to have it used to make them ridiculous. If they really think that they can get a man of skill and reputation to do what they propose for a thousand dollars, it is quite time they were undeceived. The work is well worth twenty-two thousand, without the quantities and estimates, which, if required, should properly cost eight thousand more, or thirty thousand in all. This is what would be paid to an architect by any city in Europe or America where artistic skill is held in honor, and very few architects grow rich, even with a succession of such commissions. It is quite possible to procure for a thousand dollars a diagram indicating a certain disposition of material, and at this price to reward richly the skill and thought employed in making the diagram; but two hundred thousand dollars' worth of material to a thousand dollars' worth of brains is not a proportion that has ever evolved artistic success, and the people of Indiana may rest assured that if, for every dollars' worth of stone they use, they pay ten cents to a man of first-rate skill for prescribing its shape and position, they will get what they profess to want as cheaply as it can be afforded.

IT is a long time now since the announcement was made that a competition would be held for the memorial to General Grant, to be decided next October, but the announcement was coupled with the explanation that the terms of the competition had not been fully decided upon, but would be published later. Up to this time the terms have not appeared, and, as this, from the interest of the subject, and the magnificent situation of the monument, ought to be one of the most interesting competitions of the century, it seems to us that the Committee should be reminded that the period remaining before the time for handing in the designs is far too short for a satisfactory result. Even if a man with no other work to do were to begin his design at once, he would have to hurry his drawings, and neglect the best parts of his design, to be ready in time; while for most architects of reputation, who are always busy, and must arrange long beforehand to have any given work taken up in its turn, it would be utterly impossible to get a creditable set of drawings, or a model, completed by October. It would be a misfortune to have the results of the scheme frustrated, after so long a delay, by the insufficiency of the time given to those on whom the success and renown of the monument entirely depend, and we earnestly hope that, before the circular of instructions is issued, the time will be extended at least three months longer. The participants in the famous Victor Emmanuel competition were given more than a year to study their designs; and this is none too long for the gradual process of selection and accretion by which a great and original design is developed in the mind. There is no fear that General Grant will be forgotten in twelve months; and not only the merit of the design, but the interest of the public in the competition, would be greatly promoted by allowing that period for its preparation. Something may be done in the meantime to promote the brilliancy and success of the contest. Following the excellent example set in other cases, photographs of the site of the monument from various points might, and should, be sent to all bona-fide competitors; and a short printed sketch of General Grant's life and great public services might with advantage be used to refresh their memory and stimulate their imagination. Much may also be done by a collation of the best monuments in the world, and in this we shall be glad to help, if the terms of the competition prove, as we trust they will be, such as the profession in all civilized countries has publicly approved.

DINGLER'S JOURNAL, one of the best of all technical periodicals, published not long ago an article on the influence of earthy sand in cement, which has attracted a great deal of attention, and has been widely copied. The immediate occasion of the writing of the article seems to have been the experience of the author with the concrete floor of a certain distillery. The floor was laid with what appeared to be an excellent concrete, made with one part Portland cement of the highest quality to three parts of sand. To make the concrete as hard as possible, it was carefully sprinkled every day. At the end of the month, it was still soft, and the proprietor called in scientific advice. Tests were made of the cement and sand; and the latter was found to contain four and three-tenths per cent of earthy particles, apparently marsh mud. A series of experiments was then made, by making trial briquettes of cement mixed with pure sand, and with sand containing more or less earthy matter; and, when placed under water in the usual manner, the latter were found to remain soft indefinitely. Most architects and engineers know that dirty sand is unfit for mortar or concrete, and know also how to test its cleanness, but the matter has not yet received the careful examination that it deserves. Not only vegetable mould, but clay, when mixed in small proportion with sand, will destroy the quality of mortar or cement, and even concrete of good quality is said to be injured, or "killed," by laying it on a clayey foundation; but no one, so far as we are aware, can say just how much clay in sand will prevent the setting of cement, or how far the influence of a clay substratum will extend into concrete laid upon it; or whether Portland or Rosendale cement is more injuriously affected, or how, in the many places where it is almost impossible to obtain sand that is not clayey or loamy, good mortar or concrete can be made. Architects and builders are in the way of looking to the engineers for the scientific examination of such subjects, and we should be very glad if that profession would undertake the task, for its own benefit as well as ours.

EARLY SETTLER MEMORIALS.[1]—XI.

ROBERT E. LAUNITZ.

THE first and only personality entitled to any consideration from an art point of view, that has appeared in the history of monumental art in the United States was Robert E. Launitz, of New York. His full name, as given by his family, was Baron Robert Ebrehardt Schmidt, von der Launitz. He was born in Riga, Courland, Russia, November 4, 1806.

Tradition explains the addition of Launitz to the original name of Schmidt as follows: In some early-age campaign of the Russian army a section of the Imperial Guard arrived at a little hamlet on the bank of the river Launitz in pressing need of a horse-shoer. A *schmidt* was fortunately found, and he performed his task so well that he then and there received the affix of von der Launitz to his first name, and was taken into the service of the army as a recognition of his skill and character. The subsequent careers of the descendants of the horse-shoer amply justified these marks of royal appreciation.

Of Launitz's immediate family there were six brothers. One was a Russian field-marshall and aid-de-camp of the emperor; two were generals; another succeeded his father as bishop, and the only one now living is also a general. One of his uncles was the late eminent and learned sculptor, Carl v. d. Launitz, of Frankfort-on-the-Maine, and another was a general in the Russian army.

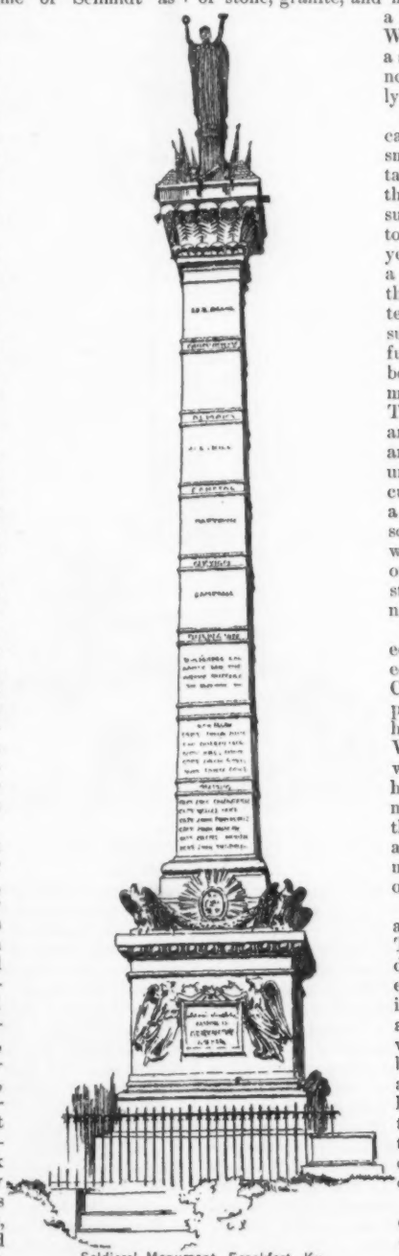
Launitz received an excellent classical and military education, and was intended by his family for a soldier, but his natural tendencies were artistic, and, following the advice of his uncle, the sculptor, who was then practising his profession in Rome, the young Robert went to that city and began his studies with his uncle, and finished them with Thorwaldsen.

What tempted him to leave the old world for the new we do not know, but he arrived in New York City in 1828, unable to speak a word of English, though thoroughly conversant with the Russian, Italian, French, German and Spanish, and quite familiar with several other languages and dialects. Besides, he had lost his hearing in Rome as the result of a fever, was unknown to a living soul when he landed, and the prospect of gaining a livelihood by the exercise of any of his talents or acquirements could not have been much more dreary if he had gone to Alaska.

At this time John Frazee, afterwards known as an able maker of busts, and the designer and builder of the New York Custom-House, was carrying on the marble business in New York. To him Launitz wended his way, was employed as a journeyman, and remained in his employ until 1831, when the two formed a partnership, and Launitz's name first appeared in the directory as a sculptor, at 591 Broadway. When Frazee received the commission to build the Custom-House in 1837, Launitz assumed entire control of their business, remaining at the old stand until 1844, when he removed to 536 Broadway, and occupied the lot afterwards built upon by the great jewelry house of Ball, Black & Company. During the first ten years of his life in New York Launitz was not, as it may be imagined, very successful. Marble work in those days was confined almost entirely to small grave-stones, plain memorial-tablets, mantel-pieces, and occasionally a trifling piece of carving. He was at times so closely pressed for the bare means of subsistence that he was obliged to cut and turn little fancy objects in alabaster for immediate sale. A curious instance of the perversity of human nature, and an illustration of the flimsy foundation upon which a large structure of pretense was constructed, occurred during these years. Ball Hughes, a young English sculptor of very conventional ability, also arrived in New York in 1828, and shortly after received a commission from some admirers of Alexander Hamilton to make a marble statue of the great statesman. When his plaster model was ready to be reproduced in marble he refused to employ Frazee or Launitz to execute it, asserting as a reason that there were no men outside of England sufficiently capable of properly executing such an important work. He therefore sent to England and imported several workmen who subsequently became, as well as some of their sons, journeymen to Launitz. Not only were both Frazee and Launitz far abler men than Hughes in all that pertained to marble work, but they were quite as good modellers.

Monument in Greenwood Cemetery. R. E. Launitz, Sculptor.

At the same time there was in Boston Solomon Willard, as able and competent a worker of stone, granite, and marble as ever swung a mallet in this country. Frazee, Launitz, and Willard served their day and generation with a skill, intelligence, and loyalty unequalled then, not since excelled, and in these later days rarely, if ever, approached.



Soldiers' Monument, Frankfort, Ky. R. E. Launitz, Sculptor.

Now and then a ripple of public interest was caused in New York by the appearance of some small piece of sculpture, from the studio of the talented Russian, heightened more or less by the sad or stirring history connected with the subject of the work. For instance, there came to Washington and the Atlantic cities, in these years, a delegation of Sac and Iowa Indians, on a visit of business and curiosity. A sachem of the former tribe was accompanied by his daughter, Dohumme, a beautiful maiden of sixteen summers. In the same delegation was a youthful Iowa chief. These children of the forest became attached to each other, loved, and were married with Indian rites at Paterson, N. J. The new couple were handsome and graceful, and attracted universal attention after their arrival in New York. Amid scenes and exposures, so unlike those to which she had been accustomed in her forest home, Dohumme caught a violent cold, followed by congestion, and death soon closed the scene. She was buried in Greenwood Cemetery, and a simple monument, decorated with a bas-relief, representing a grief-stricken Indian warrior, was executed by Launitz, and erected over her grave.

The literary circles of New York were excited in those days from time to time by the poetic eccentricities of the "Mad Poet," McDonald Clark. An oft-repeated and characteristic expression of his is as follows: "Now evening lets her curtain down, And pins it with a star." When death came he, too, was carried to Greenwood, and laid to rest near the grave of Dohumme. His monument is ornamented by a medallion portrait of himself, by Launitz. In this way Launitz became known in New York as an accomplished modeller and worker in marble, but still more as a cultured gentleman of enviable character and acquirements.

But it was not until 1845 that he received a commission of any considerable importance. This was for the statue of Miss Charlotte Canda. The circumstances which brought it into existence were so sad, the monument of which it formed a part was so elaborate and unusual at that time, and the fact that a statue in pure white marble was to be made, representing the beautiful and unfortunate lady herself, created a public interest in the sculptor that we can hardly appreciate at the present moment. Then, to make a statue, meant a great deal. Now, in the truthful words of a professor of painting in one of the largest colleges of the country, "any one can make a statue."

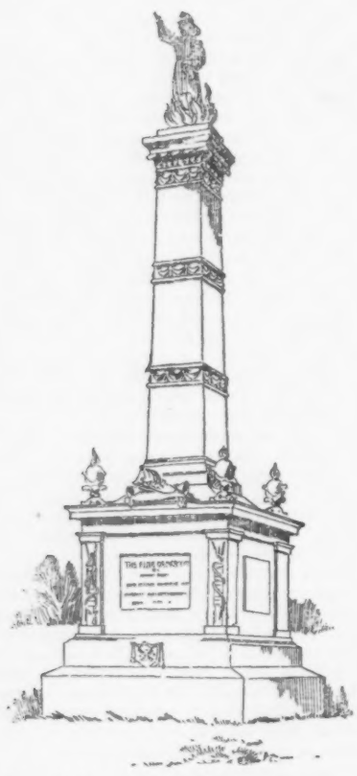
While returning from the festive enjoyments of a party of friends on the evening of her seventeenth birthday, February 3, 1845, Miss Canda was thrown from her carriage and almost instantly killed. Such an event, under any circumstances, is deeply impressive. How especially so when one who possessed the rarest accomplishments and the most extraordinary

[1] Continued from page 268, No. 597.

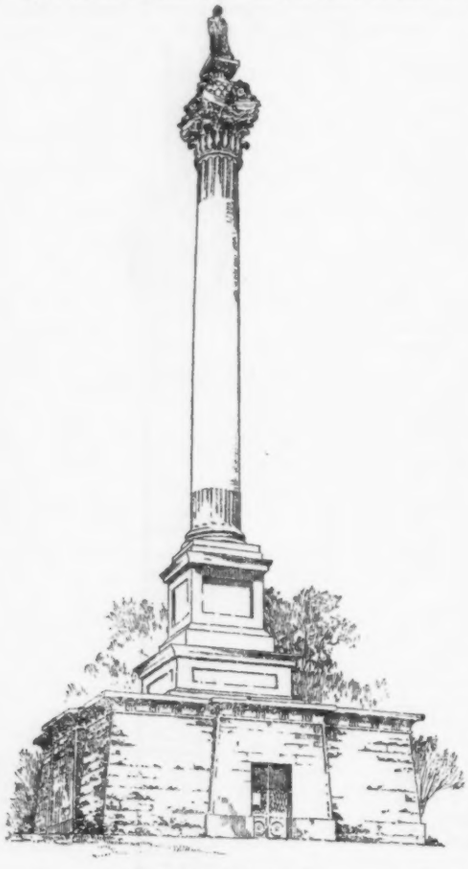
natural gifts is cut off in the freshness of youth. Such a one was Miss Canda.

The idea of the monument, in its general outline and essential features was designed by Miss Canda herself, and was intended as a tribute to a beloved aunt, whose death occurred a few months before her own, and who now sleeps at her side. The entire work was executed from drawings made by Mr. Canda. It is safe to say that no private memorial since erected in the United States has aroused so much pathetic interest and curiosity. Of the millions of people that have visited Greenwood, where it is erected, during the past forty years, not one has failed to gaze with feeling admiration upon this expression of loving remembrance. The execution of the statue carried the name of the sculptor throughout the length and breadth of the land.

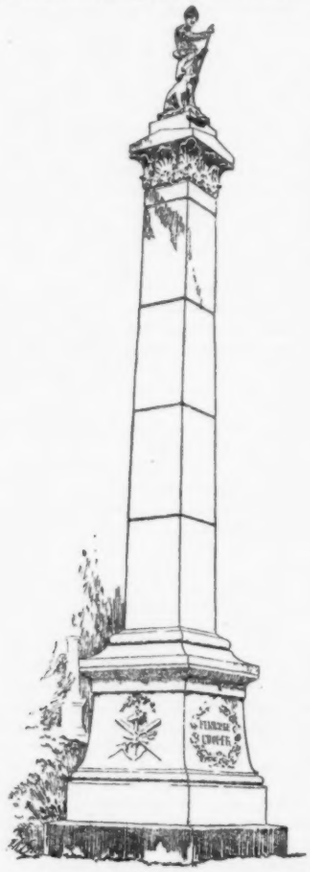
Soon after its completion the New York Fire-Department gave Launitz an order to design and execute a marble monument to the memory of the firemen of that city who had lost their lives in the discharge of their duty. It was the first large monument erected in a cemetery in the United States, and the first one that paid tribute to an element of general human sympathy. The monument is surmounted by the figure of a fireman in the very act of saving a child from the devouring flames that have already partly surrounded them.



Fireman's Monument, Greenwood Cemetery.
R. E. Launitz, Sculptor.



Monument to Henry Clay, Lexington, Ky.
Built by John Haly



Monument to James Fennimore Cooper, Cooperstown, N. Y. R. E. Launitz, Sculptor.

Its erection created a wider public interest, if such a thing were possible, than the Canda monument. The two made Greenwood a Mecca for a generation, and New York City the headquarters for fine monumental work, until the breaking out of the Civil War.

In those days there were many excellent marble-cutters, even in the smaller towns and most retired hamlets. Men who worked at their trades with a genuine intelligence and sincerity, and who regarded the execution of a fine monument as a matter of personal pride and public interest: a matter to be thought of in company with other important public acts of a representative character. The superiority of weight of material over skill had not reached their simple minds, and a surface of polished granite made by a common laborer had not superseded the work of the chisel. Hundreds of these men, employers and workmen, saved their money for the purpose of going to Greenwood to see these monuments. This was especially true of the time when the World's Fair was open in New York. The fame and name of the wondrous foreigner was on all their tongues, and many of them sought out his shop for the purpose of seeing him. The sextons of cemeteries were particularly and pridefully interested, for they all hoped that some day or other they could boast that their grounds were also adorned with some specimen of his cunning workmanship. Truly enough, these hopes were gratified to a surprising extent, for before Launitz took his place in the silent city, he had erected one or more of his monuments in nearly every large cemetery in the country, and was well known and warmly loved by their guardians. Among these appreciative admirers and oftentimes very interesting characters was an old Scotchman by the name of Carmichael who kept the grass green and the flowers in bloom over the ashes of those whom he had laid to rest in the beautiful cemetery of Frankfort, Ky., and when the Legislature of that paternal State decided in 1848 "to erect a monument to those who had fallen in the defense of their country," he hastened to tell the committee on the monument that a man in New York, by the name of Launitz, was the one they ought to employ to do the work. Fortunately the committee was composed of men who had a good monument in view, and Judge Mason Brown was chairman. He was delegated to go to New York and contract for such a structure as he thought best. The history of the contract, in the words of Launitz, is as follows: "Work had been slack for several years — though others had plenty to do — and I was on the point of giving up business and going to work as a journeyman in order to support my family, when there came into the shop one day a modest-appearing gentleman who said that he would like to look at some designs for a monument. I showed him some plain ones that I had on hand, but he said that he wanted something more elaborate, and asked me if I would make him some sketches to show him when he would call the next day. As I was pretty nearly discouraged I did not think much of this desire for sketches, but I thought I would make one more effort before giving up completely. I therefore made a design that would cost $7,000 — a large sum in those days to expend for a monument. When my client returned the next day he objected to the design because it was not large or costly enough. My breath almost left my body in astonishment, and I looked at him with surprise. I actually thought the man was crazy. I was, however, able to say, 'My dear sir, if you will be good enough to tell me what you want this monument for, and how much you wish to pay for it, I will try again.' To my still greater astonishment he quietly observed that he wanted the best war monument that could be made in America, and that the price was immaterial. I at once made a design that he accepted, and I agreed to make and erect it for $15,000. This man was Judge Mason Brown, of Frankfort, a representative Southern gentleman, and ever after my good friend."

The monument was erected in 1850, and cost its maker $17,500. The Legislature offered to pay Launitz the additional $2,500, but he refused to accept it because he had agreed to do the work for the first-named sum. It stands in the centre of the State cemetery at Frankfort, Ky., and in a locality appropriately called "The Bivouac of the Dead," for around it in concentric rows sleep the brave hearts

that have beat their lives out in battle for their country. It is sixty-two feet high, built of Italian marble, and surmounted by the Goddess of War holding in her outstretched hands the wreaths of victory. It is inscribed with the names of those who fell in the early Indian, the 1812, and the Mexican wars, the names of the battles in which they participated, and is dedicated as follows: "Kentucky has erected this column in gratitude equally to her officers and soldiers."

Near it are monuments to the memory of many of Kentucky's most distinguished sons, early settlers and later makers of her fame. Under its very shadow lies the body of the author of that deathless elegy, "The Bivouac of the Dead," Major Theodore O'Hara. The poem was written, it is thought probable, in the cemetery in 1847. No finer tribute was ever paid by poet heart to soldier dead. This is the first verse:

"The muffled drum's sad roll has beat
The soldier's last tattoo;
No more on life's parade shall meet
The brave and daring few.
On fame's eternal camping-ground
Their silent tents are spread,
And glory guards with solemn round
The bivouac of the dead."

And this, the last:

"Yon marble minstrel's voiceful stone
In deathless songs shall tell,
When many a vanished age hath flown,
The story how he fell:
Nor wreck, nor change, or winter's blight,
Nor Time's remorseless doom,
Shall dim one ray of holy light
That gilds your glorious tomb."

O'Hara died in 1867, and was buried in Georgia, but in 1874 the Kentucky Legislature, ever jealous of the possession of the ashes of her sons, brought all that was mortal of the poet to Frankfort, and together with the remains of two governors and several distinguished officers of the Mexican War, reinterred them in the State cemetery. There the soldier-poet sleeps his last sleep by the side of his old comrades, and amid the scenes consecrated by his genius.

As we write, the newspapers inform us that the remains of Hart, Kentucky's sculptor, who died in Florence, Italy, have been recently brought from that city, by a Commissioner of the State, and also interred in the State cemetery.

In the classic virtue of love for the dead, as displayed by Kentucky, she stands quite alone of all the States of the Union. The ashes of her sons are her sacred inheritance, and their fame her crown of glory. The resolutions passed by the Legislatures in reference to the erection of memorials to their memory are models of grateful and noble appreciation of private worth and public bravery. They read like the expressions of domestic affection, and they were carried out, so far as the monuments made by Launitz are concerned, with an intelligence and loyalty that excite surprise in the later days of monumental jobbery.

The State cemetery probably contains as many examples of the varied styles of Launitz's monument as any other in the country, with the exception of Greenwood. In view of these facts it seems astonishing that this State could set up such a pile, to such a man, as the Clay monument at Lexington, and at a cost of $77,000. And this, too, in seven short years after the war monument consecrated the soil of the State. The Clay monument is one hundred and thirty-two feet high. Its erection illustrates the old and unpleasant fact of how small an influence a good piece of work has upon a community. The Washington Column in Baltimore had been completed nearly thirty years, yet the lessons it might teach to builders of similar structures did not reach Kentucky, and as far as known they have not left the municipal boundaries of Baltimore.

This human fatality of bad monuments following in the wake of good ones, attended Launitz throughout his whole life with a persistency that has never been equalled. Within half a stone's throw of this Fireman's Monument stands as wretched an object as ever desecrated a grave-yard. It was set up soon after Launitz erected his work, and the persons who made it, and those who paid for it were as well satisfied with its ugliness as they would have been with a Phidian masterpiece. Another fatality of a still worse nature also followed Launitz. No sooner did he erect a specimen of his beautiful workmanship than a miserable imitation of it would soon follow. Greenwood is full of such imitations. One successful monument-maker made it his special business to copy the designs of Launitz, underbid him in price and execute the work in an inferior manner. Shameful to say, he succeeded in this scheme of debasement.

T. H. BARTLETT.

CORONATION-CHAIR EXPLANATIONS. — Mr. Plunket, replying to Sir Thomas Esmonde in the House of Commons on the evening of July 4, said: "It is true that certain missing portions of the Coronation Chair in the Abbey were, for the purposes of the recent ceremony, of necessity replaced by new work, but this was very carefully arranged, so that they could be again removed without any damage to the chair, and they have been so removed. It is true also, that a considerable portion of the chair was slightly darkened. That, too, was done so as to be easily capable of being undone, and the chair is now, both as to substance and color, exactly as it was before it was given into my charge. I am so fortunate as to be able to state that the Dean of Westminster and the President of the Society of Antiquaries are well satisfied with the careful manner in which the monuments and the structure of the Abbey have been treated by the Office of Works. — *Pall Mall Gazette.*

HINTS FOR BUILDERS.[1]—III.

MORTARS AND CEMENTS.

PASSING on from bricks, brick-making and brick-laying with which my last chapter was concerned, I come now to a consideration of that which holds or binds them together, and which, in some instances, notably that of the old Romans, was in reality far stronger and more permanent than the stones which it was originally designed to bond together.

Although this chapter has to do primarily with mortars and cements, I shall have to dwell a little longer upon that portion of the bricklayer's work which is more intimately associated with the division under notice.

Thus all bricks, when placed in the hands of the layer, have about them certain peculiarities and imperfections, more or less marked, which must be dealt with according to the nature of the work in hand and the respective merits of each brick. One of these peculiarities is the "frog," which is a sinking purposely formed in one side of the brick, being found in stocks, pressed and the majority of hand-made bricks. The proper way to lay a brick having a frog is to keep this side uppermost — the top bed, the flat side being known as the bottom bed. This frog very much facilitates the bedding of the bricks, in placing each succeeding layer or course, on account of its affording room for the surplus mortar, which would otherwise have to be exuded from the edges at the sides. Never lay bricks with the frogs downwards, as the mortar not being in the cavity a hollow space is created, and consequently the weight of the mass is thrown upon the edges of the courses instead of being spread evenly and uniformly over the whole of each brick, and in the case of large walls or arches it is very likely that the bricks will burst, and break or "spall" off in large flakes when the bricks are so wrongly laid, this being particularly the case when the bed is at all fine. I may mention that the frog is a comparatively modern invention, none of the old bricks having it.

Another peculiarity in the greater number of bricks, particularly hand-made brick — the machinery of late years remedying this defect — is that they are bevel-headed; that is to say, out of square at the ends — the top edge overhanging the bottom, and more so at one end than the other, the defect arising during manufacture while the bricks are plastic. Stocks as a rule are more often affected thus than any other description of brick, and this fault causes much inconvenience to the brick-layer, especially in forming angles, the difficulty being got over, so far as possible, by regulating the bed accordingly.

I come now to the joints formed by the layers of mortar between the bricks, the horizontal layers being known as the bed-joints, and the vertical layers as the cross-joints, which again in fair-faced work are called "perpends." The usual way in England to determine the thickness of the bed-joints is, at the beginning of the work, to take four of the bricks from the stock of those selected with which to carry out the job, set them up one upon the other, then measure the height, and add 1¼ inch for the four joints — thus, as an example, say the four bricks measured 10¾ inches, add 1¼ inch for the joints, which consequently makes 1 foot for every four courses — this being the guage. A rod should be provided, with the courses marked upon it accordingly — this being the guage rod. Of course the guages can be differently struck, but the above serves as a good sample from which to work. Bricks without a frog will require a higher gauge, as frog-made bricks are capable of a closer joint than those made without a frog. It is a great mistake to build brickwork with large joints, both pecuniarily and otherwise, as the larger the joints the greater the settlement. Also in the erection of all new brick buildings, care should be taken to avoid so far as possible, the carrying up of one portion to any considerable height before another, on account of the risk of unequal settlement.

To sum up this portion of my subject, I may say, in conclusion, that a good brick should be uniform in size; standard 9 inches by 4½ inches by 2½ inches — (the sizes vary somewhat in different descriptions, as I have pointed out) — weight about 7 lb.=110 lb. per foot cube; is rectangular, true-faced, but only one end and one side need be smooth, has no print sinking on either face, but a hollow on one or both beds. When saturated with water a brick should not absorb more than 20 per cent of its own weight of water, should absorb it reluctantly, and part with it freely at ordinary temperature. It should be uniformly burnt, should be sound, free from cracks, flaws, stones, lumps of any kind, but particularly pieces of lime (whether red, yellow or white), should have a metallic ring when a couple of bricks are struck together; and when broken should be sound right through, should be tough and pasty in texture, and not granular, and should require repeated blows to break it instead of one hard blow.

Mortar is a substance consisting essentially of lime and silicious sand, the lime being in the state of hydrate, employed for the purpose of cementing stones and bricks together. The sand employed is

[1] Continued from page 271, No. 597.

of different degrees of fineness, from the finest river or pit sand up to the coarsest gravel, the latter, when mixed with lime or water, forming concrete. When the lime which is used for the manufacture of mortar has been taken from a limestone containing clay, or argillaceous matter, the mortar possesses the quality of setting under water; then the lime is termed hydraulic lime and the mortar made therefrom, hydraulic mortar. Such mortars which, are also termed cements, are also prepared in conjunction with lime, from certain volcanic productions, such as *pozzuolana*, and *trass*, besides certain products of artificial calcination. As, however, the basis of all cements or mortars is lime, I shall deal first with the carbonates of lime. Pure carbonate of lime is found in calcareous spar and a few other minerals, but the majority of the calcareous rocks contain other ingredients besides carbonic acid and oxide of calcium, these ingredients being magnesia, oxide of iron, manganese, clay, bitumen, quartzose sand, etc. The term limestone is applied to those stones which contain at least one-half their weight of carbonate of lime; and accordingly as the other ingredients may prevail, a limestone may be argillaceous, magnesian, sandy, ferruginous, bituminous, etc.; these varieties being still further distinguished, according to their forms and texture, as laminar, saccharoid, granular, compact, oölitic, chalky, etc. The limes obtained from one or other of these stones vary in quality, color, weight, hardness except when manufactured into mortar. Lime is prepared from limestone by the action of heat in kilns, arranged so as to deprive the limestone of its carbonic acid as completely as possible in the shortest time, with the smallest quantity of fuel and the least amount of labor. The action of lime when slacked with water is very different with the various kinds, and this action establishes certain important differences between them. Imagine, as an example, the lime is fresh, and is immersed in water for five or six seconds, the water being then run off and the lime turned into an earthenware vessel. The action will then be as follows:

1. The lime hisses, crackles, swells, gives off much hot vapor, and then immediately falls into powder.

2. The lime remains inactive for some time, generally not more than five minutes, when the appearances described above under 1, may become actively developed.

3. The lime may remain inactive from five to fifteen minutes, when it will begin to smoke and crumble, though the heat and vapor will not be so great as in the preceding phenomena.

4. The lime may remain passive for a long time — over an hour even — when it will crack without any noise, and very little heat or steam will be produced.

5. The above phenomena are produced at different times, and are scarcely perceptible. The heat is only evident to the touch, the lime does not fall at all readily into powder, and at times not at all. Before the effervescent action has quite departed, the slacking of the lime should be finished. When the lime begins to crack, water should be poured down the sides of the vessel containing the lime so as to fall to the bottom and there be absorbed by the lime. It must then be frequently stirred, and a sufficiency of water added so as to bring it into a thick consistent paste. Then leave it to cool, which will generally occupy from two to four hours. It must then be beaten up again, adding more water if necessary, until the mixture forms into a thick paste as before. An earthenware vessel should then be filled with this paste and the whole placed under water, and the duration of the immersion carefully noted, as owing to the results thus obtained can limes be divided into five classes thus, — 1, rich or fat; 2, poor; 3, moderate hydraulic; 4, hydraulic; 5, highly hydraulic. The first of these consists of pure or very nearly pure oxide of calcium, and the purer the carbonate of lime from which they are produced, the more decided the appearances during slacking. These limes increase in volume to double their original bulk, their consistency does not alter, and if exposed to pure water, frequently renewed, they would be entirely dissolved. The second of the limes on being slacked only increases in bulk to a very trifling extent. They will not set under water, but will be dissolved by it, except a small residuum. The third limes will set in from 15 to 20 days' immersion, and continue to harden for months. They change in bulk in slacking very slightly, and dissolve with difficulty in water frequently renewed. The fourth description of limes will harden generally in from six to eight days after immersion, and so continue to harden for six months. In a year they are of the consistence of soft-building stones, and water has no further action on them. Their change in slacking is very slight. The last mentioned set in from three to four days after immersion, become quite hard in a month, and are not affected by running water, while in six months they can be worked similarly to the harder natural limestones, which they much resemble in fracture. Their change in bulk is slight while slacking.

I shall not enter into the chemical composition of all these limes, as this would serve no very useful purpose, and beside would occupy much valuable space. Suppose a rich lime to be mixed into a thick paste, and then left for some time exposed to the air, it will gradually dry up, and there will then remain a friable mass of hydrate of lime. If, however, a thin layer of this paste be interposed between a couple of smoothly-dressed porous stones the greater part of the water in the paste will be absorbed in the stones, and the thin layer of hydrate of lime sets and adheres strongly to the stones. The absorption of the water must not be too quick, or the hydrate will set too quickly, and in that case will not become hard, therefore the two surfaces of the stone should be wetted before the lime is applied, and also, as the adhesion between the hydrate and the stone is greater than that between the particles of the lime, the layer of the latter between the stones should be very thin and evenly spread. A much better and firmer substance, however, is procured by mixing with slaked lime twice its weight of quartzose sand, or any similar material, powdered, and then mixing and stirring the whole well up with water. This mixture must then be spread by means of the trowel over the surface of the nether stone, and the other stone placed evenly upon it, when the excess of mortar is pressed out, and only a thin layer left. In this instance, each grain of sand is enveloped in a covering of the lime, which prevents the mortar from contracting, and subsequent fissures. The proper setting of the mortar does not depend upon the evaporation of the water only, but also upon the combination of the lime with the carbonic acid of the air. Those parts of the lime which come into contact with the air become converted into carbonate of lime, but the interior parts form a combination of carbonate and hydrate of extreme hardness. A great length of time is, however, necessary for this state to be attained, for after many years the lime will still exist as a hydrate, and consequently mortar made with it should never be employed in thick walls where it cannot possibly dry. Rich lime mortar should never be employed for outside brickwork for the reasons which have been pointed out above — namely, unequal drying, as if so used, it will exude on the first frost and then dry friable. If so used, a large quantity of sand should be intermixed to prevent excessive shrinkage, but, generally speaking, it should only be used for plastering and sanitary purposes. An advantage with it is that it can be worked again and again without injury, and consequently large quantities can be made at one time, without any loss.

Having dealt thus fully with lime and its principal constituents and qualities, I come now to a brief consideration of the subject of cement. Fifty years ago the principal cement in general use for building purposes was the well-known, but now almost forgotten, Roman cement, or, as it was very often called on account of its dark-brown color, black cement. It was of a very quick-setting nature calling for very careful treatment. It was in quality very varied, that being the best which was slowest in setting. It would not bear a large proportion of sand, and was only extensively employed in waterside works. Another cement, very quick in setting, is the Medina cement, but as it is difficult to use in brickwork, it is not necessary to touch upon it further here. Among the other natural cements are, in England, Harwich, Calderwood, and Whitby, which are mostly employed for plastering, as they possess no great strength, and will not stand the weather. I come now to the artificial cements, the principal among which is the well-known Portland, which is manufactured by an intimate admixture of chalk and clay, the proportions being varied according to the composition of the chalk, the object being to get a mixture possessing about seventy per cent of chalk to thirty per cent of clay. These are mixed together in water, and run into tanks called backs, where the mixture remains till it becomes nearly solid. It is then dug out, dried, burnt, and finally ground to powder, this process being known as the wet one. The dry process is generally adopted where limestones are used in lieu of chalk, the stones being crushed by machinery and the clay burnt like ballast, the two being then mixed in suitable proportions and ground to powder. This is next thoroughly mixed in a pug-mill and made into bricks, when these again are burnt, dried and ground to powder, which completes the process. This is the more tedious method, and there is a great difference in the quality, caused principally by unequal burning, and great care has to be exercised in selecting the cement-clinkers for future grinding into powder. Portland cement is the strongest and most valuable of all the artificial cements, but it takes longer to set than any of the other descriptions. In works of any importance the quality of Portland cement is tested in a variety of ways — its weight per bushel, the degree of fineness to which it has been ground, its tensile strength, its color, its behavior both in and out of water, and its quickness in setting. The *weight* varies from ninety-five pounds to one hundred and thirty pounds per bushel, the measure being filled as lightly as possible, and struck level on the top. This is not a good test, as, first, it is not possible to fill all bushels alike; secondly, a lightly-ground cement will not weigh so much as a coarse-grained one; and thirdly, there are many light cements of first-rate quality, and many heavy cements which are really worthless. The heavy sorts set slowly, and possess greater strength than the lighter kinds. The *fineness of grit* is a very good and important test, and should consequently be carefully attended to, as this finely-ground cement, when mixed with sand, makes the strongest mortar. The fineness can always be tested by rubbing between the fingers, also, by passing through a fine sieve, the smallest employed having 2,500 meshes to the square inch. For ordinary purposes the sand should pass through a sieve of 900 meshes. The *tensile strength* is not of very great importance for ordinary building purposes, but in engineering works the reverse is the case. Testing-machines are employed for getting the strength, the cement being formed into small "briquettes" and immersed in water for six or seven days, when they are placed in the machine and called on to sustain 400 pounds pressure to the square inch without fracture. In *color* good Portland cement should be of a good gray, darkness denoting too much clay or too heavily burned. Usually, a light color and a light weight cement denote a quick setter, but a bad cement may also be of a good color. In *setting*, good Portland cement sets more slowly than any other, the time depending on the quality, the best setting slower and attaining greater strength than the commoner

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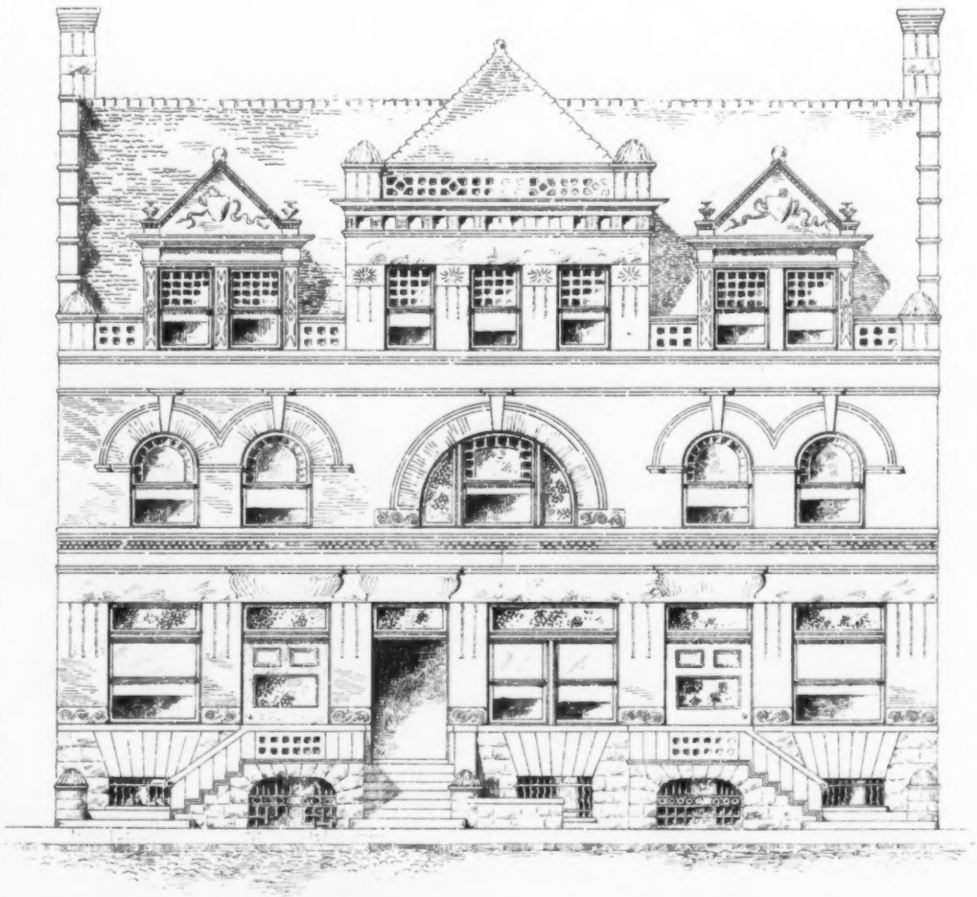

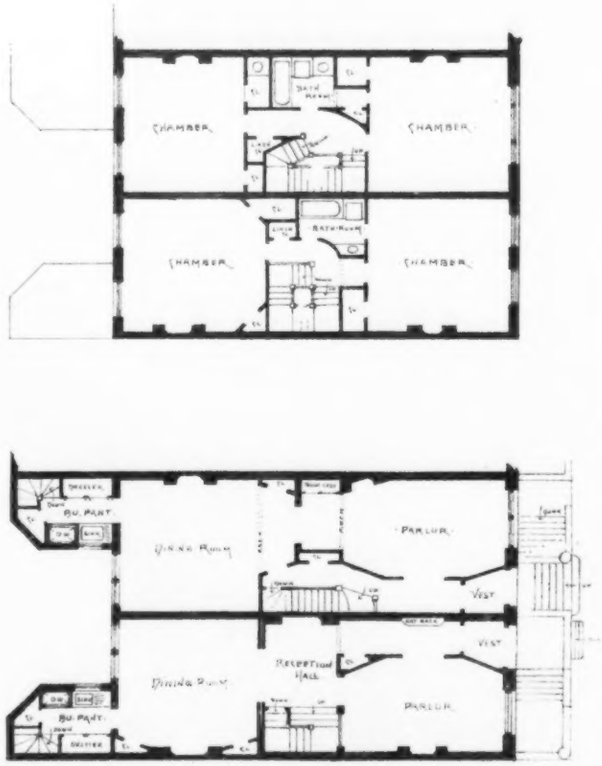

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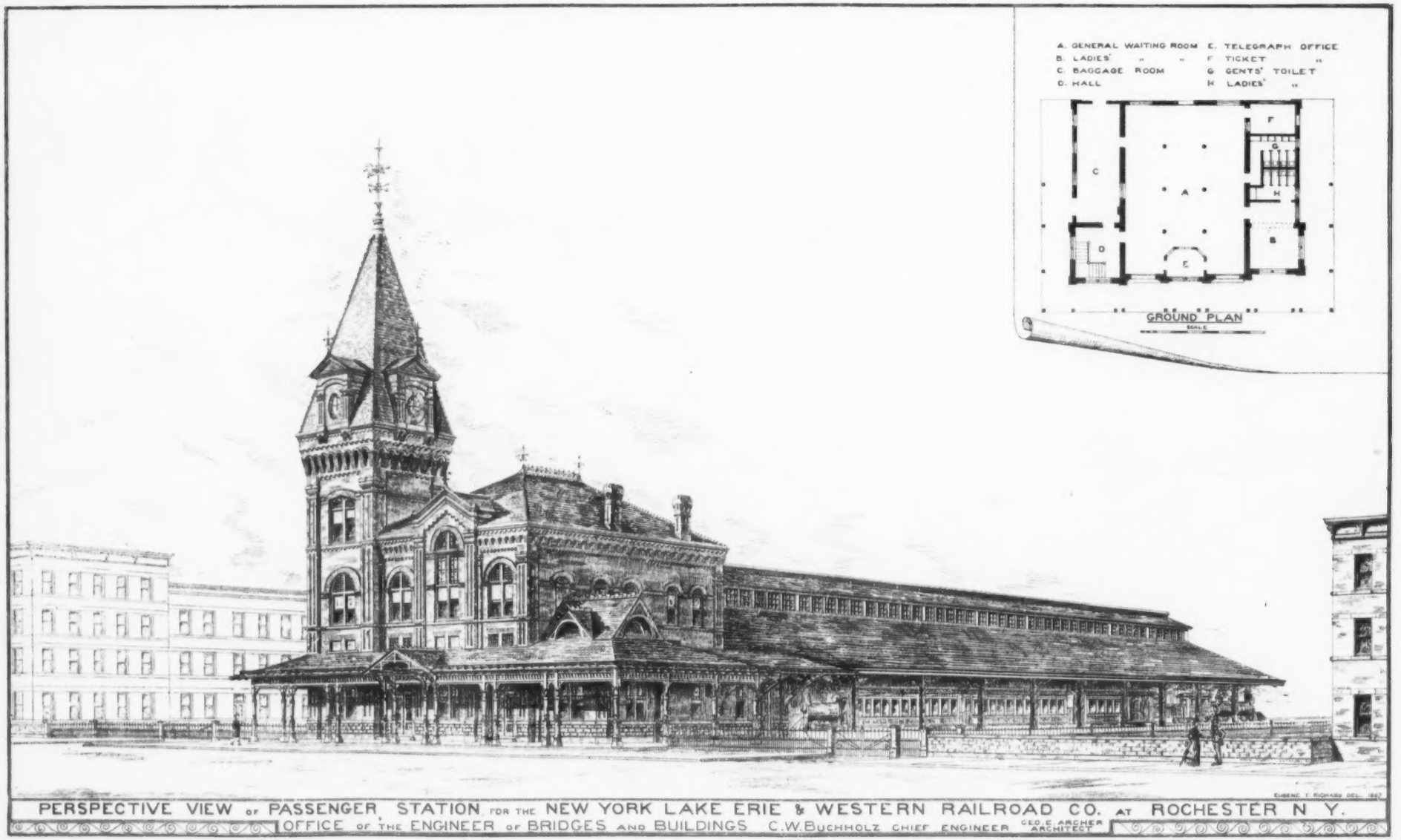

PERSPECTIVE VIEW OF PASSENGER STATION FOR THE NEW YORK LAKE ERIE & WESTERN RAILROAD CO. AT ROCHESTER N Y.

OFFICE OF THE ENGINEER OF BRIDGES AND BUILDINGS C.W.BUCHHOLZ CHIEF ENGINEER GEO.E ARCHER ARCHITECT

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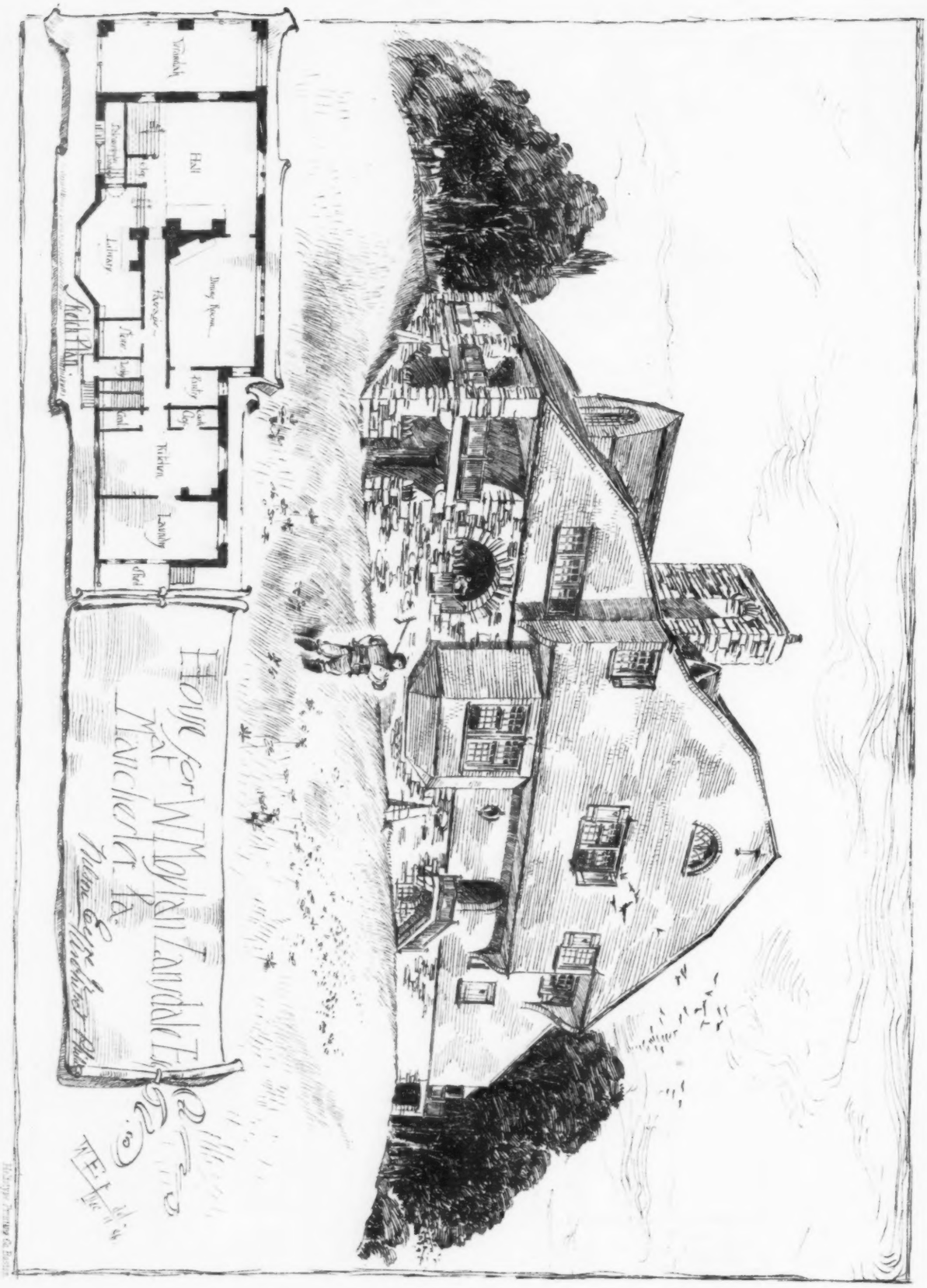

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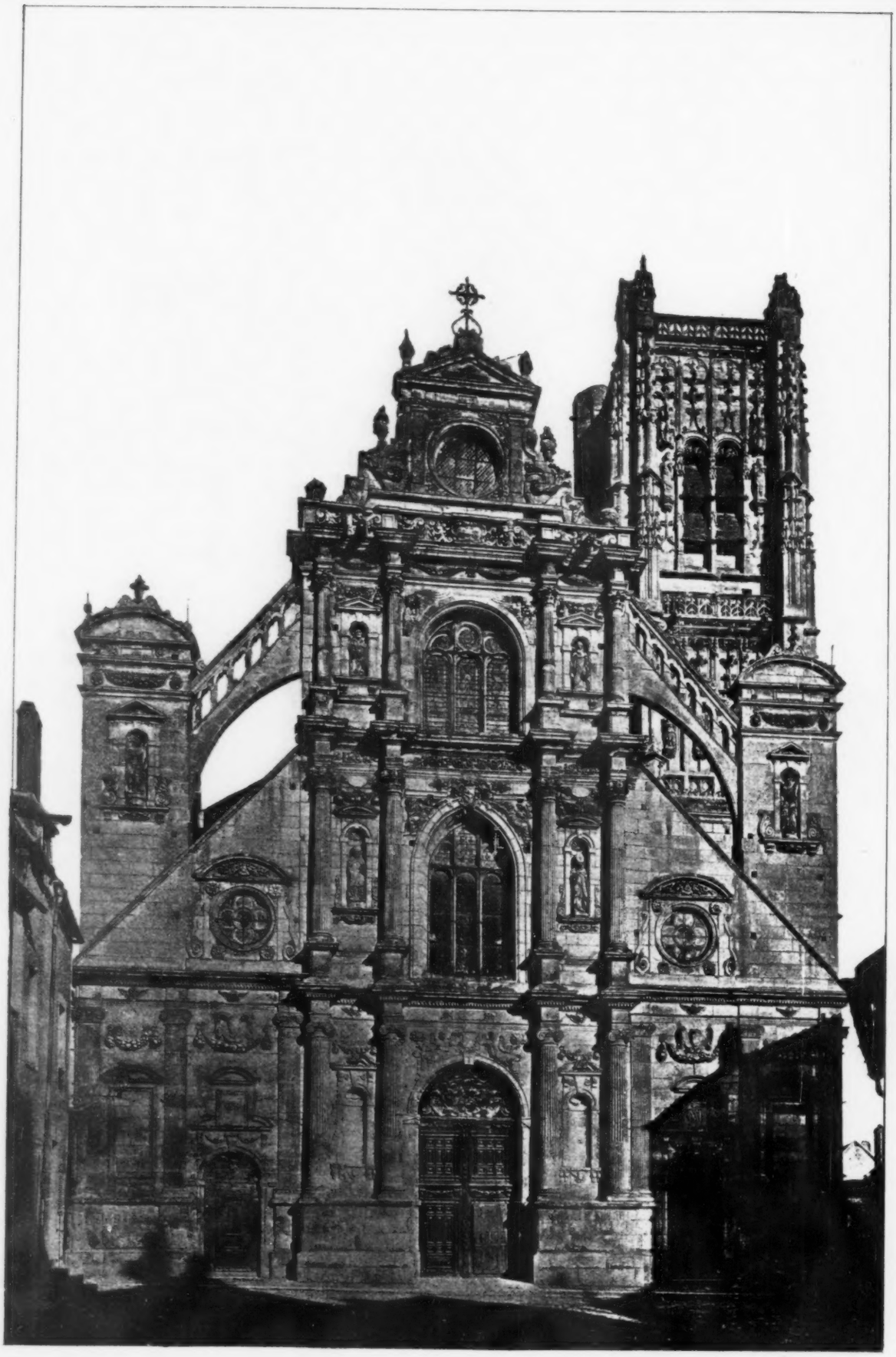

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descriptions. The usual plan of testing the setting quality is to make small pats about one-half inch thick and three inches across, thin at the edges, with neat cement; one is placed under water as soon as it has set, and another is left in air and then left for twenty-four hours, when they are examined. The one placed in water should show no signs of cracking at the edges, cracks denoting too much lime; the one left in the air should retain its original form and color; if it contains too much clay it will have a yellowish appearance. Care must be exercised in testing the pats not to use too much water or too little, as either will make the cement defective, and quick-setting cements require more water than slow-setting ones. These pats should set in from three to six hours. Portland cement should always be turned out from the bags in which it is received onto a wooden floor in a room protected from the weather, and in the course of a month turned over several times so as to become air-slaked thoroughly, and when in perfect condition should feel just warm. It must be used as soon as mixed — in this way resembling plaster-of-Paris — and must never be reworked after it has commenced to set.

I have dwelt thus at length upon Portland cement, on account of its importance; I shall now pass on to a brief note on the Keene's, Parian, and Martin's cements. The first named is made by soaking plaster-of-Paris in a solution of alum, and recalcining it. The cream-color, which is sometimes given to it, is caused by adding a little copperas to the mixture. It is manufactured in two qualities, the coarse and the superfine. Parian cement is got by mixing powdered plaster-of-Paris with a strong solution of borax; it is then recalcined, ground, and mixed with a solution of alum. In Martin's cement the process of manufacture is similar to that of the preceding, carbonate of potash being employed instead of borax. It is made in three qualities — coarse, fine, and superfine. These cements are only used for indoor work — such as skirtings, angle-beads, mouldings, etc. — for which they are all admirably adapted.

To come now to mortar, I must remind my young readers that its quality depends very largely upon the manner in which it is prepared, and also upon the quality of the sand, the quantity of water with which the lime has been slaked, and the greater or less perfect mixture of the materials. The sand should be rough and sharp, and in all cases mortar should set slowly. The mortar for ordinary work consists of one part stone-lime to three of sand; the sand is made into the form of a basin or crater, into which the lime is thrown in a quick state; water is then added to slake it, and the whole covered up with sand; after remaining in this state until the whole of the lime is reduced to powder, it is worked up with the sand, and the whole passed through a wire screen, which separates the core or unslaked portion of the lime. Of course, this is the ordinary hand practice, such as would have to be adopted for small jobs, but for large undertakings the mortar making and mixing machine could be called into requisition where hand labor would be largely dispensed with. When the mixture has passed through the screen more water is added to it, and it is then thoroughly well larryed up for use. In a few hours it sets and is ready for use. Seventy-two bushels of good stone-lime and eighteen yards of sand, when formed into mortar, should have a cubical content of 315 feet. In dry places ordinary mortars made with rich lime take considerable time in solidifying, in moist places they solidify with difficulty, and under water not at all, hydraulic mortars being then employed. As mortar-mills and pug-mills are, I take it, tolerably well known to all of our readers, I shall not touch upon them here, but for the reason that men are sometimes called upon to do small jobs, I have thought it advisable to include the hand-mixing in my paper.

In my next chapter I shall treat of masonry and mason's work.

W. N. BROWN.

[To be continued.]

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

THE CHAPEL OF THE LITTLE WELL, GUADALUPE, MEXICO.

[Gelatine Print, issued only with the Imperial Edition.]

THE Chapel of the Little Well (*La Capilla del Pocito*), is a perfect little gem, built in the year 1791. It consists of two circular buildings connected, the well or mineral spring which first gushed forth from the rocks upon the occasion of the Virgin's last visit, being in the smaller one, that first entered from the street. The other is a chapel. Its interior is not attractive. The circular walls are of stone, elaborately carved about the doorways and windows, and unfortunately painted a dark red where not carved, thus giving it a handsomer appearance in a picture than in reality. The domes are of glazed tiles in alternate zig-zag lines of dull yellow and dull blue.

HOUSES FOR C. R. LEE, ESQ., CHICAGO, ILL. MR. F. W. BEALL, ARCHITECT, NEW YORK, N. Y.

THESE houses are to be three story and basement, of Philadelphia pressed brick, with blue-stone trimmings, rock faced, laid up in red cement "of irregular sizes." There is an entrance to basement under front stoop, with a passageway partitioned off leading to kitchen in rear; front part of basement to be used as cellar, in which there will be furnace, coal-bins, etc. There will be a staircase leading from basement to first floor reception-hall, and another from kitchen to butler's pantry. Kitchen will be provided with range, two wash-tubs, sink, larger pantry, and closets. From vestibule which will be neatly tiled and tinted in dark colors we enter hall, in which there is recess for hat-rack. Entering from hall to parlor, which will be neatly finished in mahogany, with neat tiled mantel and hearth, separating parlor and dining-room, there is a reception-hall with broad fireplace and stairs broken by several landings. Hall and dining-room to be finished in old oak. Dining-room has closets, and connects with butler's pantry in which is a dumb-waiter, sink, dresser, closets, and stairway to kitchen.

Second floor to have two larger chambers with ample closets. Front chambers to connect with spacious bath-room, lighted overhead by skylight, to be ventilated at roof. Third floor to have three chambers, servants' and store rooms. Roof of end houses to have pitch of 60°, which will not be detrimental to shape or appearance of chamber. Each room to have neat wood mantel to correspond in color to rest of woodwork. Houses to be provided with gas, speaking-tubes to kitchen, etc.

PURITAN CONGREGATIONAL CHURCH, WILKES-BARRE, PA. MR. A. H. KIPP, ARCHITECT, WILKES-BARRE, PA.

THE cost is to be $8,500, complete except gas-fixtures.

PASSENGER STATION FOR THE NEW YORK, LAKE ERIE AND WESTERN R. R., ROCHESTER, N. Y. MR. GEORGE ARCHER, ARCHITECT. MR. C. W. BUCHOLZ, CHIEF ENGINEER.

HOUSE OF W. H. HOLLIS, ESQ., CHELSEA, MASS. MR. WILFRED A. NORRIS, ARCHITECT, BOSTON, MASS.

HOUSE FOR W. MOYLAN LANSDALE, ESQ., MANCHESTER, PA. MR. WILSON EYRE, JR., ARCHITECT, PHILADELPHIA, PA.

CHURCH OF ST. PIERRE, AUXERRE, FRANCE.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1] — VI.

BRICKWORK.

BRICKWORK, though not the most expensive, is by far the most important material used in building; first, because the great majority of structures entitled to the name of buildings are built of brick; and, secondly, because in buildings with stone and iron fronts, the general stability of the structures is dependent upon the brickwork, and the weights of the walls, floors and roof are most always carried by the brickwork, except where columns and piers are required, when these are frequently made of iron or stone.

As before stated in connection with stonework, except for small buildings the brickwork for walls is usually let in a contract separate from the other work in the building. The floor arching, paving, etc., is seldom included in the same contract with the walls, as it is not deemed advisable to have these classes of work executed until after the roof is completed and it would interfere with brick contractors, after the walls in their contract were completed, to wait several months for the roof, before finishing the arching and paving.

SPECIFICATION.

The contractor to furnish all the labor and materials, bricks, mortar, etc., and build complete all the brick masonry of walls as shown on the drawings and called for in the specification, including bedding and setting plates for ends of iron beams, girders, trusses, etc., and building-in all the iron and wood work of floors and roof, cramps, anchors, etc., that may be necessary, and which will be supplied by the Government.

On the plans and sections the portions of walls hatched in alternate broken and solid lines indicate bricks.

Common Brick. — Generally all unexposed exterior walls of building and areas, the backing of exterior walls, the foundations for steps and all interior walls and piers are built of common brick. All the common brick to be best quality, hard-burned, square-edged, sound, free from limestone, etc., and taken from the heart of the

[1] Continued from page 7, No. 601.

kiln; no bats, soft, salmon, or defective brick will be allowed to be used.

The common brickwork to be best quality, bonded every fifth course through the whole thickness of wall with headers thoroughly bedded and jointed in mortar, laid solid and as close to each other as the character of the brick will allow; the joints of each course of brick to be flushed full with mortar well worked in with the trowel, and also grouted with thin mortar in addition to the flushing.

Thickness of Walls. — As before stated, the brick walls of a building are made sufficiently thick to carry all the weights of the structure, and where stone or pressed-brick facing is used, it is not considered in determining the thickness of the brick backing; but the backing is made just as thick as the walls would be if constructed without the facing. The exterior walls, and interior bearing and partition walls are never made thinner than is required by the New York City building law (which may be conveniently found in "*Kidder's Architects' and Builders' Pocket-Book,*") but are generally made from 4″ to 8″ thicker. The backing of exterior walls is never made of less than two-and-a-half bricks (because it usually includes flues 8″ wide built one brick's length from inside face of wall, and at least one-half brick must be between the flue and outside facing of wall) except in the top story where sometimes a two-brick wall is sufficient. Interior walls sustaining floors and roof-trusses are made not less than one-and-a-half bricks (usually two bricks) thick and partition-walls are made one brick thick for upper story, one-and-a-half bricks thick for the two next stories, and one-half brick additional thickness added for each two lower stories.

Size of Piers. — Brick piers are used much more frequently than either stone or iron, both for interior work and in walls between openings where they are frequently overlooked as being really piers; yet the information and data concerning their strength and stability are very meagre and seldom definite: while many experiments have been made as to the crushing strength, etc., of bricks, yet the deductions therefrom seem not to have been put into such shape as to be of much practical use. Good brickwork laid in best cement mortar, which is always used by the Government, is generally calculated to sustain safely nine tons to the square foot (that is, a factor of six). This is assumed to be safe up to 10′ or 12′ high, increasing the size of the pier in accordance with its height; no pier over six feet high should be less than twelve inches square. Brick piers like wood and iron posts and columns are liable to break by bending as well as by crushing after they are built to a certain height; their strength decreasing in proportion to their height, but not uniformly.

The following table has been carefully calculated upon this basis by an experienced engineer, and has been used by him for years, but has never before been in print:

No. of times smallest diameter or width contained in height.	Safe weights per square foot in tons and tenths. Factor 5.	Safe weights per square foot in tons and tenths. Factor 4.
1	9.8	12.3
3	9.5	11.9
6	8.	10 0
9	6.3	7.9
12	4.8	6.
14	3.5	4.4
16	2.7	3.4
18	2.1	2.6
20	1.7	2.1
25	1.1	1.4
30	.8	1.

Interior Walls. — The interior walls not having concrete or stone footings to have quarter-brick offset for footings, with a double course at bottom; the interior brick piers to be square and plumb; the backing of area walls to have 2″ offsets as shown; and all brick backing to be properly bonded to stone facing.

All brick must be properly and thoroughly wetted immediately before being laid.

Trowel Pointing. — The exposed joints of brickwork in basement, ventilating and elevator shafts, and in attic rooms which are not to be plastered are to be neatly trowel pointed; all the remaining joints to be cut off rough for plastering directly on the brick.

Arches. — Arches in brickwork are usually built either segmental or semi-circular. Segmental arches are generally constructed to a radius equal to their span or width of opening.

Where extraordinary or uneven strains are to come upon arches, their strength should be carefully calculated; generally speaking, arches of four feet span and under are built of two-half brick rings; from 4′ to 8′ span in three half-brick rings, and over 8′ span in four half-brick rings. The edges of bricks at intrados of arch to be as near together as the character of the bricks will allow, and at extrados where the joints open on account of the radiation from centre to be well filled in with slate wedges or spawls, and filled perfectly full and flush with mortar.

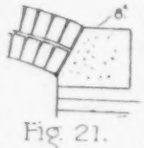

Fig. 21.

All brick arches throughout to have stone skewbacks, the height to be equal to the depth of the arch, and to be eight inches wide at top as per Fig. 21.

The arches of interior reveals of door and window openings in exterior walls, and openings in interior walls to be in two, three or four half-brick rings, as shown, properly bonded, and to extend through the full depth of reveal or thickness of wall; the arches over openings in vent-flues to be straight, 8″ deep; where several openings come together with small brick mullions, relieving-arches are to be built over each series of openings.

Centres. — The contractor to furnish the materials, cut, build, and properly set all the centres for the arched openings in brick walls, which must not be struck or eased until the mortar is thoroughly set. The centres of square-headed openings to be left in place for securing trim of doors and windows, to.

Air Inlets. — Under the window-sills where indicated on drawings, air inlets to be constructed as shown, the space under window-sills to be 1″ and the vertical space to be 2½″ wide, and near the floor to have two low segment arches in one half-brick ring, the half-brick inner wall to be tied with brick withes and built up close to underside of sill.

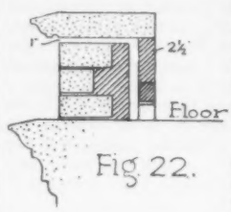

Fig 22.

Flues. — Flues for ventilating purposes, smoke flues and chases for down-pipes and goose-neck connections, and for soil and heating pipes to be constructed where shown and of the dimensions noted, all to be built regular and true with selected fair brick. The backs of chases for piping to be plumb from bottom to top, and all chases to start at footings. Recesses for heating-pipes to commence 12″ below basement ceiling, and at head of openings ¼″ x 3″ flat iron to be built-in as a lintel.

The smoke-flues to be lined with terra-cotta rectangular pipes, usually 8″ x 12″, which must be closely mitred at all angles and jointed and set in clear cement, the joints to be perfectly tight to prevent the smoke injuring the mortar in the brickwork should it come in contact with it; and where so noted on plans the smoke flues to be provided with soapstone thimbles 9″ x 9″ x 4″, with pipe holes 7″ in diameter, properly set in positions.

The heating and vent flues to be provided with No. 26 B. W. G. galvanized-iron flue linings, securely riveted at sides and at all joints and mitres, to be built-in with the brickwork and the brick built close against same; care to be taken to prevent mortar getting into the flues; proper elbows, connections and dampers to be provided for all register openings into same. The register faces and frames will be included in the heating contract.

Air-Spaces. — Air-spaces or cavities to be formed in the brickwork of exterior walls to be one brick's length from inside face of wall, to be generally 4″ wide (sometimes 2″), the inner wall to be tied to the outer with brick ties or withes built with ordinary bricks properly bonded and not more than 2′ distant on centres; the cavities to be entirely bricked over at least 1′ below all floor and ceiling joists and roof-rafters, so that the weights from same may be properly borne by both walls; the mortar joints in cavities to be neatly trowel pointed, care to be taken that no part of the cavities is filled by the falling of mortar; openings to be left at all points where chases, cavities, etc., are liable to become clogged with mortar and at completion to be cleaned out and the openings carefully bricked up. [Air-spaces are left in walls to prevent dampness coming through; it would undoubtedly make a stronger wall, keep out the dampness just as well, if not better, and be about as cheap, to omit this air-space, make the wall that much thinner, and face the inside of exterior walls with hollow terra-cotta furring blocks about 2″ thick, which should be thoroughly secured to walls.]

Skewback Courses. — The contractor to build-in purposely made skewback brick for the springing of brick arches of first-story floor and all vaults, the skewbacks for first floor to be single as per Fig. 23, and for all vaults to be double as per Fig. 24, the courses to be built on two sides of each room at the levels which will be given by the superintendent.

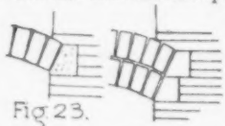
Fig 23.

Fig. 24

Corbelled Courses. — For supporting the terra-cotta arches of the upper stories, corbelled courses to be built on two sides of each room, etc., at level of bottom of iron beams as shown by Fig. 25.

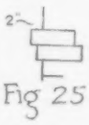

Fig 25

Corbelled or projecting courses of brick to be also built and properly bonded on all walls where indicated on drawings for the plaster architraves and cornices of the rooms, corridors, etc., in the several stories, the number of courses and projection from face of walls, which will be about 2″ to be as shown by details to be furnished.

Hollow Bricks. — The hollow brick walls to be built with approved hollow partition-block properly bonded. Any good pattern made by the terra-cotta companies may be used for these partitions, but one constructed as per Fig. 26, is preferred; the blocks may be from 3″ to 8″ thick, hollow inside and the material of blocks and ties to be 1″ thick, every joint to be provided with an inside tie the outside of blocks to be roughly scored for plastering; the blocks and ties to be set in clear cement mortar with joints not over ¼″ wide.

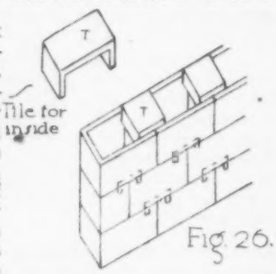

Fig 26.

Setting Bed-Plates. — The Government will furnish all the bond-

stones, bearing-plates for beams, girders, trusses, columns, etc., and the bearing-plates required on top of iron girders for brick walls to rest upon [these plates may be slate, stone or iron, depending upon which is cheaper in the locality where needed], but the brick contractor to properly bed and set same in the required positions and levels, and will also be required to properly build-in all iron and wood work of floors and roof.

Where the beams of floors or roof are not on hand in time for the masonry, the contractor will be required to leave pockets in the brickwork sufficiently large for the beams, etc., to be slipped in place and proceed with the masonry in order that the work may not be delayed, and after the beams have been set will be required to brick up the pockets around same, solid.

Arrises, Bevels, etc. — The contractor to do all cutting of bevels, curves, skewbacks, etc., required; the arrises to be plumb, straight and true, and the faces of walls to be perfectly vertical and out of wind. The dimensions of walls, openings, flues, recesses, etc., to be as shown on the drawings.

Cramps and Anchors. — The contractor to build-in all the iron cramps, anchors, tie-rods, etc., that may be supplied, all to be thoroughly imbedded in mortar.

Joining Walls. — Where new work is joined to old, and where dwarf or other walls join onto main walls in which there would probably be much settlement in one wall and not in the other, straight and plumb channels are to be cut in the old work or formed in the new, not less than 4″ deep, by the brick contractor and the walls built and joined closely in the channel.

Shoring. — Where walls temporarily project beyond their supports, or any cutting out under walls is required, the contractor will be required to thoroughly and substantially shore up under these projections, and after these supports are in, to build up solidly under the walls.

Mortar. — The mortar for all the common brickwork to be best quality, two-thirds by measure of clean sharp sand, one-third by measure of freshly-ground cement (equal to the United States Government brand) and a quantity of stone-lime paste equal to one-third of the quantity of cement, all thoroughly mixed and used before the first set.

Building Walls. — The courses of brickwork to be kept perfectly level throughout, and the walls built uniformly; that is, one part of the building must not be built up more than about 4′ 6″ or a scaffold high before the remainder is brought to the same level, unless otherwise ordered by the superintendent.

The bricklayer must follow the stonework closely, backing up thereto and building the interior walls, etc., in proper consecutive order, and he will not be allowed to delay the setting of the stonework in any way.

Protection during Construction.—All projections, mouldings, angles, etc., of common pressed and moulded brickwork to be substantially protected by boards, etc., from injury during construction, and the tops of brick walls to be covered with boards to protect them from rain, etc., and, if considered necessary by the superintendent, to be covered whenever leaving off work; and should winter intervene before completing the work, great care to be taken to prevent water and frost getting into the walls, and the contractor must assume all responsibility for shutting-down work or for working too late into the winter season; the contractor to furnish all lumber, nails, tools, etc., and labor necessary for such protection and maintain same until completion of work.

Pressed and Moulded Brick. — Where brick is used for facing the walls of a building, all the walls above ground line (or water-table as the case may be), jambs and reveals of openings, inside walls of porches, walls of areas, dormers, chimneys and ventilating-shaft to be faced with pressed and moulded brick equal to the best Baltimore, Philadelphia, or St. Louis make.

All moulded and ornamental courses, projections for bands, imposts, hood-moulds, cornices, etc., to be red pressed and moulded brick of the various patterns shown by details, the numbers of which are taken from the catalogue of the Peerless Brick Company, of Philadelphia, Pa.; bidders, however, are not confined to this make of brick, but must adhere to the profiles and designs shown or indicated.

The pressed facing and moulded brick to be laid and properly bonded, the body of walls laid as stretchers and bonded to backing as often as the courses coincide, which should be at least every fifth course; the brick for skewbacks and arches to be purposely-made or gauged and rubbed to the required radii, and jointed and bonded as shown; all pressed and moulded brick to be laid and jointed in best quality lime putty (or pulp black or red mortar as designed) properly tempered, the joints to be fine ruled and not over $\frac{1}{8}$″ wide. If necessary, special bricks to be used for all circular portions, made to the required curves.

All cutting and rubbing of the face and moulded brick must be nicely done and show a clean straight joint, no filling with putty and coloring it to match brick will be allowed.

The kind of bond between pressed and common brick is not usually specified, each contractor being allowed to use his particular system; sometimes the diagonal bond is called for, which is done by cutting away the rear corners of the pressed brick, thus leaving an unbroken front of stretchers, and laying the common brick diagonally into these corners, as per Fig. 27; sometimes the Flemish bond is called for, which is a single course of brick headers and stretchers, alternating and laid every fifth or sixth course.

Terra-cotta Trimmings.—All moulded and ornamental work which cannot be easily executed in brick — pilaster bases and caps, keystones, terminals of hood-moulds, panels, spandrels, finials, etc.—and which are usually indicated on the drawings, to be best quality red terra-cotta, in strict accordance with the full-size details and models which will be furnished by the Government to the successful bidder. All to be moulded evenly and perfectly burned, clean, out of wind, and of the designs and dimensions shown, and free from imperfect edges, cracks and all defects. All the terra-cotta to be bedded and set in the same kind of mortar as the pressed brick; to be properly anchored where necessary with galvanized-iron cramps, ties, etc., in best manner, which must be supplied and built in by the contractor.

Fig 27

Selected brick should be treated in the same manner as pressed brick, except that it may be made to look very nice with joints $\frac{1}{4}$″ thick in red mortar or black.

Enamelled brick is seldom used except for handsome halls and vestibules; it should be treated as pressed brick; the mortar to be best lime putty tempered with plaster-of-Paris and colored to match the enamel.

Projecting Courses. — Projections for pressed and moulded brick should not be more than 2″ or 3″ for each course, the total projection of a series of courses or corbels should not exceed 18″, and wherever the projection exceeds 6″ beyond face of wall above, it should have a capping of stone, slate or metal; the stone or slate capping should extend from extreme edge of projection to from 4″ to 8″ under the wall above same; where metal is used for cap-flashing, it should be copper or galvanized iron, eighteen ounces per square foot, well bedded on top of projection in cement; have the outer edge turned up under nosing of brick to form a drip, and the inner edge to run at least 3″ under the succeeding course of brick, which will be laid on top of flashing to hold same in place; all mitres and joints of flashing to be neatly made and thoroughly welted and soldered watertight.

Fig 28

The top joints of all unflashed projections, etc., to be raked out and pointed full and flush with Portland cement mortar (one part cement and one part sand). All metal cap-flashings to have two coats of non-corrosive metallic paint and a finishing coat of lead and oil paint tinted to match the face brick.

Washing Down and Pointing. — At completion, the bricklayer to wash down and clean all face brickwork, using a solution of muriatic acid and water in proper [proportions one-half pound muriatic acid to a pailful of water; this will also remove efflorescence on brick caused by cement stains, etc.], to oil one coat, using color if necessary, and all joints to be neatly pointed and finished.

All scaffolding for building the face brick to be erected entirely independent of the walls, and no put-log holes in the face brick will be permitted at any time.

MEASUREMENT.

The brickwork in walls is measured in feet and inches and is estimated by the thousand. Many brick-masons in the eastern States measure thus: the length of the wall by the height, deducting the openings, and the surface thus obtained mulplied by the number of bricks to the square foot of wall, which, of course, depends upon the thickness, being generally taken at fourteen bricks for a wall one brick thick, twenty-one bricks for a wall one and one-half bricks thick, and seven bricks additional per square foot for each additional half brick thick; but generally speaking, the most of them measure the total cubic feet of brickwork in all walls and multiply by the average number of bricks per cubic foot as laid in the wall, generally about twenty, and this is the system in use by the Government. The net cubic feet of brickwork in the walls should be obtained; all openings over 2′ 0″ square should be deducted; for the deductions the heights of openings are taken only as high as the springing, both for segmental and semi-circular heads, as the cost of the centering of arch is worth as much as the brickwork for that space; all recesses in brickwork also to be deducted, and stone in brickwork, except bond and bearing stones in walls. Chases, air-spaces and flues of all kinds are not deducted.

After getting the cubic feet of common brickwork, the number of bricks to the cubic foot is obtained as follows: first, measure the exact size of the brick to be used, and, as the walls generally average not less than one and one-half bricks, estimate the number per cubic foot for a wall of this thickness; the mortar joints average generally $\frac{3}{8}$″ thick, which thickness of joint must be added to the length and height of brick and two-thirds of this thickness to its width; after obtaining these dimensions, multiplying them together will give the number of cubic inches occupied by each brick, with its joints in the wall; dividing this number into 1728 will give the number of bricks per cubic foot.

Example.

Exact size of brick, $8\frac{3}{8}$″ x $4\frac{1}{4}$″ x $2\frac{1}{4}$″.
Allowing for joints, 9″ x $4\frac{1}{2}$″ x $2\frac{3}{8}$″.

Multiplying the latter dimensions will give $106\frac{3}{10}$ cubic inches per brick. $\frac{1728''}{106\frac{3}{10}''} = 16\frac{1}{4}$ bricks per cubic foot.

It must be borne in mind that the sizes of bricks vary all over the

country; about the largest are made in Washington, Baltimore and Philadelphia, and about the smallest in Maine, the former averaging about seventeen to the cubic foot, and the latter about twenty-five; in New York State they average about twenty-one, and West and South twenty-two and one-half bricks to the cubic foot are usually estimated for, but this latter figure is too large, as the average will not exceed twenty.

The size of the moulds for brick are generally made 9″ x 4½″ x 2½″, but as all clays shrink differently in burning, this partly accounts for the variation in size.

All facing and moulded brick are also estimated by the M. The plain facing brick are measured, reducing to square feet, allowing full measure at all angles and returns, to pay for the extra labor at those points, and multiplying by the number of bricks to the square foot (usually seven) obtained in same way as the number of common brick, adding ⅛″ for joint to length and height of brick.

Moulded brick are measured by the lineal foot for each different pattern, as the price is dependent upon the pattern, and allowing one and one-half bricks per foot for stretchers and three bricks per foot for headers; all angles and returns are measured full on both sides, also mitres. In deducting for openings in facing bricks, the height should only be taken to springing line, as in common brick.

Terra-cotta work is usually estimated at so much per piece, depending on the size and design of the pattern from those in stock, which, of course, cost less than special designs. Terra-cotta is usually made hollow, with the necessary flanges and stiffening ribs, but some few manufacturers make it solid.

COST.

The cost of brickwork depends on the cost of the bricks and delivering same at the building, the wages of brick-masons and helpers, the cost of mortar and the use of tools, machinery and scaffolding.

Constants for Mortar per M. Brick.

M = .50 cubic feet (20 bricks per foot).
Sand = .35 cube yard.
Cement = 1.46 barrels of 300 pounds.
Or lime = 1.75 barrels.

Labor per M., including tools, etc., is about seven-eighths of mason's and helper's wages per day for ordinary city buildings, but for Government buildings it is about one and one-fourth times the same wages. This difference is principally because city houses generally have long party walls, with very few openings, and the frames for doors and windows are set in place while the brickwork is being built, whereas, in Government work, all four sides of the building are fronts, and there are a great many windows and openings in the walls, which, of course, take more time to measure and build to than if the walls were plain, and the frames of doors and windows are not put in the building until the masonry is completed and the roof is on; besides, as a general rule, the work is better and stronger. Some of the brick walls for the building now being erected at Rochester, N. Y., had to be taken down, on account of an extension having to be made, when it was found necessary to drill and split the brickwork with wedges in order to get the walls down, the cement mortar very often being stronger than the brick.

A brick-mason with helper should lay in common house walls 1,200 to 1,500 bricks per day of ten hours; in Government work, the average is from 800 to 1,000 for common brick and in pressed and moulded brick from 150 to 300 per day.

Cost of Common Brick per M. Delivered.

1884.	Columbus, O	$ 6.00	1886.	Pittsburgh, Pa	$ 8.00
"	Baltimore, Md	8.00	"	Des Moines, Ia	10.00
1885.	Jackson, Miss	4.00	"	Dallas, Tex	8.50
1882.	Toledo, O	8.00	"	Jefferson City, Mo	8.00
1883.	Denver, Col	7.50	"	Rochester, N. Y	8.00
1886.	San Francisco, Cal	8.50	1884.	" "	7.00

Cost of Brickwork per M. laid complete.

1884.	Poughkeepsie, N. Y	$21.50	1885.	Fort Wayne, Ind	$16.00
1885.	Dallas, Tex	16.00	1884.	Rochester, N. Y	14.00
"	Brooklyn, N. Y	15.35	1886.	" "	15.50
"	Pittsburgh, Pa	14.00	"	Des Moines, Ia	17.00

PRESSED BRICK.

Bricks alone, delivered, cost from $20.00 to $30.00 per M.; selected red, about $15.00 to $18.00 per M.

Cost per M., Pressed Brick, laid complete.

1884.	Poughkeepsie, N. Y	$60.00	1885.	Brooklyn, N. Y	$40.00
1885.	Jackson, Tenn	65.00	1886.	San Francisco, Cal	45.00

Moulded bricks cost from $40.00 per M. up to $120.00, depending upon the profiles; the average for the profiles ordinarily used is about $70.00, and the cost of laying averages about $30.00 per M.

Enamelled-bricks, on edge, cost about $68.00 per M.,
" " and end, cost about $ 75.00 per M.,
" " and flat, " 100.00 "

and the cost of laying them is from $30.00 to $35.00 per M.

The price of terra-cotta depends upon the pattern or design, the average cost per square foot of exposed surface laid in wall complete being, for stock patterns, about $1.50, and for special designs, from $2.00 to $2.50.

Jas. E. Blackwell.

[To be continued.]

SOME DATA ON STEAM-HEATING.

THE following data on steam-heating, taken from my note-books, cover some points which were arrived at in the course of professional practice, and which have stood the test of years of special experience.

When the direct system is used to heat buildings such as abound in our great cities — buildings in which the street floor is a store, and the upper floors are devoted to sales and stock rooms and to light manufacturing, and in which the fronts are of stone or iron, and the sides and the rear of building of brick — a safe rule to follow is to supply one square foot of boiler heating-surface for each seven hundred cubic feet, and one square foot of radiating-surface for each one hundred cubic feet of contents of building.

For heating mills, shops and factories, one square foot of boiler heating-surface should be supplied for each four hundred and seventy-five cubic feet of contents of building, and the same allowance should also be made for heating exposed wooden dwellings. For heating foundries and wooden shops, one square foot of boiler heating-surface should be provided for each four hundred cubic feet of contents, and for structures in which glass enters very largely in the construction — such as conservatories, exhibition-buildings and the like — one square foot of boiler heating-surface should be provided for each two hundred and seventy-five cubic feet of contents of building.

When the indirect system is employed, the radiator-surface and the boiler-capacity to be provided will each have to be, on an average, about twenty-five per cent more than where direct radiation is used. This percentage of twenty-five also marks approximately the increased fuel-consumption in the indirect system. When the overhead system of steam-heating is employed, in which system direct-radiating pipes, usually one and one-quarter inches in diameter, are placed in rows overhead, suspended upon horizontal racks, the pipes running horizontally and side by side around the whole interior of the building, from two to three feet from the walls, and from two to four feet from the ceiling, the amount of one and one-quarter inch pipe required, according to Mr. C. J. H. Woodbury, for heating mills (for which use this system is deservedly much in vogue) is about one foot in length for every ninety cubic feet of space. Of course, as Mr. Woodbury points out, a great range of difference exists, due to the special character of the operating machinery in the mill, "both in respect to the amount of air circulated by the machinery, and also the aid to warming the room by the friction of the journals."

Prof. Charles A. Smith gives the following data for the relation between radiating-surface and cubic contents, as representing the results of the practice of the Dubuque Steam Supply Company, Dubuque, Iowa. He says: "We find that with the external air ranging to 0 degrees Fahrenheit, one square foot of heating-surface warms a number of cubic feet, as follows, in columns 2 and 3":

Class of Building.	When heaters are in same rooms (direct system), cubic feet per square foot.	When heaters are in basements (indirect system), cubic feet per square foot.
Dwellings	50	40
Stores, wholesale	125	100
" retail	100	80
Banks	70	60
Offices		
Drug stores	80	70
Dry goods	125	100
Large hotels	200	150
Churches		

For determining the cross-sectional area of pipes (in square inches) for steam-mains and returns, it will be ample to allow a constant of .375 of a square inch, plus, for each one hundred square feet of heating-surface in coils and radiators, .375 of a square inch when exhaust-steam is used, .19 of a square inch when live-steam is used, and .09 of a square inch for the return. If the cross-sectional areas thus obtained are each multiplied by one and three-elevenths, and the square root extracted from each product, the respective figures obtained will represent the proper diameters, in inches, of the several steam-pipes referred to.

To the following table, presented by Mr. William Kent, M. E., in Vol. VI of the "*Transactions of the American Society of Mechanical Engineers*," relating to the height and dimensions of chimneys required for the several horse-power of boilers mentioned, I desire to give my cordial endorsement, as it accords well with the figures of dimensions which have given the most satisfactory results coming within my own experience and observation. During the last two years I have had occasion to test its value at least twenty-five times,

and in some cases have instituted changes in large steam-plants on its basis, with the most gratifying results :

Diameter of round chimney, in inches.	Height of Chimney.										Side of square chimney, in inches.
	50 ft.	60 ft.	70 ft.	80 ft.	90 ft.	100 ft.	110 ft.	125 ft.	150 ft.	175 ft.	200 ft.	
	Commercial Horse-Power of Boilers.											
18	23	25	27	.....	.....	.....	.....	.....	.....	.....	.....	16
21	35	38	41	.....	.....	.....	.....	.....	.....	.....	.....	19
24	49	54	58	62	.....	.....	.....	.....	.....	.....	.....	22
27	65	72	78	83	.....	.....	.....	.....	.....	.....	.....	24
30	84	92	100	107	113	.....	.....	.....	.....	.....	.....	27
33	.....	115	125	133	141	.....	.....	.....	.....	.....	.....	30
36	.....	141	152	163	173	182	.....	.....	.....	.....	.....	32
39	.....	.....	183	196	208	219	.....	.....	.....	.....	.....	35
42	.....	.....	216	231	245	258	271	.....	.....	.....	.....	38
48	.....	.....	.....	311	330	348	365	389	.....	.....	.....	43
54	.....	.....	.....	.....	427	449	472	503	551	.....	.....	48
60	.....	.....	.....	.....	536	565	593	632	692	748	.....	54
66	.....	.....	.....	.....	.....	694	728	776	849	918	981	59
72	.....	.....	.....	.....	.....	835	876	934	1023	1105	1181	64
78	.....	.....	.....	.....	.....	.....	1038	1107	1212	1310	1400	70
84	.....	.....	.....	.....	.....	.....	1214	1294	1418	1531	1637	75
96	.....	.....	.....	.....	.....	.....	.....	1496	1639	1770	1893	80
99	.....	.....	.....	.....	.....	.....	.....	.....	1876	2027	2167	86

— *Alfred R. Wolff, M. E., in the Stevens Indicator.*

COMMUNICATIONS.

RECTOR PIERSON'S GRAVE.

BOSTON, July 5, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT :—

Dear Sirs, — I thank Mr. William P. Pierson for his kindness in correcting the misstatements I made in the Rector Pierson article that appeared in the *American Architect* of June 4.

I sent a man to Clinton, Conn., to get information about the Pierson memorials, and he was told by an old resident of the town that the old red sandstone tablet was believed to mark the grave of the Rector. When I wrote the article I noticed that the date on the stone made him an old man, though not one of an impossible age.

My statement that Gen. Wm. A. Pierson, of Windsor, Conn., was "the only living male descendant of Rector Pierson, the first president of Yale," was made to me by the general himself, in 1872, and under the following circumstances: When the Pierson statue was first under consideration he said to me that he supposed, as he was the only living male descendant of the rector, and as he had often been told that he closely resembled his ancestor, that the sculptor who should make the statue would probably take his type of head and general *physique* as a guide, if not as the basis of his work.

The appropriateness of this supposition was peculiarly manifest and just, for the general was a fine-looking man and illustrated the temperament of the scholar and gentleman. After he saw the statue in the sculptor's studio, he expressed to me his strong disapprobation of its lack of any family resemblance, or of its indicating anything especially characteristic or illustrative of his ancestor.

Having kindly set me right in regard to the grave-stone of one of the sons of the rector, and stated the interesting fact that many hundreds of his male descendants are living, will Mr. Pierson please to state where the ashes of his ancestor do repose, and whether there is any stone to mark the place? Thus enabling me to complete a full statement concerning an important point, the last resting-place of the first president of Yale, and what his many hundred male descendants have done to keep it in remembrance. T. H. BARTLETT.

THE EXHIBITION OF PEN-AND-INK DRAWING.

ST. PAUL, MINN., July 28, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT :—

Dear Sirs, — My first impression upon opening your last issue was that you were kind-hearted sorcerers, and, having discerned one of the most wished-for wishes of my heart, had taken the trouble to realize it and delay my journal just so that it arrived here on my birthday — yesterday.

Leaving metaphor alone and relating plain facts, I will tell you that for years back I have been comparing the work of our best draughtsmen and trying to determine whose style of rendering I liked best, so that I could adopt it — or, at least, modestly try to imitate it; but the drawings were all so good, and the subjects, of course, differed so much, that I found myself still plodding along in an old rut that I fell into, way back in the "forties."

Of late I have been thinking over some scheme or another to get three or four sketches of the same object, by different artists, but never said a word about it excepting that it would be next to impossible to get them (at least without $). So that you can easily imagine how delighted I was to see the Messrs. Fenn, Gregg, Kirby & Company's sketches. I am going to have them all framed and hung up in my bed-chamber, hoping that they will affect me as beautiful statues and paintings are supposed to have affected the Roman matrons of old; of course I don't want to be affected in *exactly* the same manner, but — well, you know what I mean.

I would have been content to enjoy this great pleasure in silence had I not heard several old fogies complaining that the "*American Architect* was going down hill" — nothing but a lot of pictures and trash, no more *architecture* like there used to be in the ——— and ——— journals, when they (both fogies and journals) were young.

Now, gentlemen, I will not ask you to perform the "father, son and donkey" act, but you have so often delighted and instructed us young ones of the new school, that we can well afford to be generous to the old chaps, and contemplate sending you a well-signed petition shortly, asking that you sacrifice one whole page per year to these "old fogies," and that upon that page be depicted a beautiful scroll-sawed "bracket" in all its agony. In the meantime, I am, gentlemen,

Yours most gratefully, J. W. FITZPATRICK.

[OUR correspondent's remarks suggest the desirability of complaints being made to us direct. — EDS. AMERICAN ARCHITECT.]

A GOOD LOCATION FOR ARCHITECTS.

NEW YORK, July 26, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT :—

Dear Sirs, — By statistics which come before your notice, can you give me your opinion as to a good location in the West for an energetic young man just starting in the profession. I would like a city of fifty to seventy-five thousand inhabitants with a goodly amount of building. Please confer a favor in letter or paper, as I am a reader.

Respectfully, L. D. CARTER.

[KANSAS CITY, MO., offers, perhaps, the best opening. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

A MINIATURE MODEL OF HEIDELBERG. — Homer says that, to the sound of music and by magic forces, the walls of Troy rose in one night, but with no more marvellous impulses than are to be found in the deft fingers of a patriotic old man, the ancient German city of Heidelberg has sprung up on the south shore of Staten Island. This American duodecimo edition of the famous city is on the grounds of Mr. Alois Peteler, a native of Bavaria. The idea was suggested upon his return from several years' travel in Europe, during which his permanent resting-place had been Heidelberg. With numerous photographs, drawings and plans of Heidelberg, aided by a thorough knowledge of his subject, Mr. Peteler began the foundation of his little city, and now, sitting on his comfortable front porch, can look over the roofs of this town of Lilliput, and into the court-yard of the great castle, so rich in romance, tradition, and folk-lore. Every detail of the original structures is reproduced with the fidelity of the photographer, and all with the delicate touch of an artistic hand. From the balcony it is easy to imagine that it is the real city, only dwarfed by a distance of perhaps four or five miles. Looking over the battlements of the castle and between the houses and great buildings one can see the turbulent waters of the Neckar hurrying past to join the Rhine; below the fertile valley (formed by a stretch of the green sward of the garden) and against the horizon the outlines of the distant Vosges mountains, created from a grassy mound of irregular earth. The little city is built to endure. There are no makeshifts, no glue, pasteboard, or carpet-tacks, but stone, cement, gravel, brass and iron. The buildings are upon a plateau of stonework elevated by stone steps. The houses are about five feet in height, while the tall towers of the castle run up to six or seven feet. Guilliver's description of his visit to Mildendo, the metropolis of the kingdom of Lilliput, would serve very nicely in describing a walk through the reduced Heidelberg.

In walking about the Staten Island city of Lilliput it was not necessary to take off your coat for fear of damaging the houses with the skirts, they were built too solidly for that; and in the court-yard of the castle it was only needful not to take too long steps for fear of damaging some of the small gardens or running into the picturesquely-covered well. The age of the little half-ruined walls and towers and of the ancient buildings and palaces is very well simulated. With hammer and chisel to crumble the stone, and the aid of one or two powerful acids, Mr. Peteler has worked wonders, and the shattered portion of "the blown-up tower" of Heidelberg lies in a bit of ditch moss-grown and aged exactly like the famous original.

Not being subjects of Lilliput, Mr. Petefer's visitors did not pass under the teeth of the wooden portcullis which projected from the archway of the great entrance to the castle on the south side, and on which two lions guardant are cut in bold relief, but contented themselves by looking over the battlements into the square upon which various buildings front, studying them from the convenient rustic seat.

A familiar German tradition is recalled by a deep well, over which is a ornamental roof supported by stone pillars.

"In Heidelberg it is known as the '*Buben quelle*,'" Mr. Peteler said, "and it is regarded with mystery by all the children, for the mothers of Heidelberg tell their children that it is there they were found, as in Holland they tell them that a stork brought them."

"There is no romance more interesting than the history of Heidelberg castle," said the patriotic old man, who was apparently delighted to talk of his hobby; "that palace is the northern portion of the castle square; it was for many centuries the residence of the Electors of Palatine, who were the immediate governors of Heidelberg. The many architectural styles in the group of buildings shows the taste of their various founders and the history of some of the buildings is very interesting."

While the courteous old man talked, the afternoon sunshine flooded

the great square of the little Heidelberg. A narrow black line rent aslant the upper front of the palace. It was the shadow on the sun dial, and it marked the hour of 4. "The sun dial is just as it is in Heidelberg," he said, "and I can tell the time as well on the little face as by my watch."

Frederick's palace, which is shown on the northern side of the little square, is of the most beautiful design. Mr. Peteler has reproduced, with the greatest fidelity, over a hundred busts of the electoral governors which are used in the decoration of the front of the palace. Even the coats-of-arms and quarterings over the entrances are clearly cut. The little building is constructed entirely of cement, which has hardened in the sun to the consistency of stone. It is of a warm red in color. The blown-up tower, half of which is an artistic heap of ruins, was manufactured out of fresh Portland cement. It was blown up by the French during the Thirty Years' War, but the masonry was so massive that it simply split in two, one-half remaining erect and the other half falling into the ditch of the castle.

Another interesting building is the miniature "English palace" at Heidelberg; there is a pretty arch in front of it which commemorates the marriage of Frederick V to the English princess. Next to the palace is a wee bit of a garden with some tiny plants growing in it. In the original garden, Mr. Peteler declared, the English princess took her walks.

Conducting his visitors around the square, Mr. Peteler led them up a short flight of steps, and through an aperture in one of the buildings showed them a fac-simile of the famous Heidelberg Tun. It is really thirty-six feet long and twenty-four feet high, and capable of holding 284,000 bottles of wine, although the little model is not more than twelve inches in length and six or eight high. On the top of the great tun is a platform on which the old gentleman said eighteen couple could dance. At the back of the castle is a broad balcony which overlooks the lower town. Mr. Peteler placed his finger on the imprint of a human foot cut into a cement floor of the balcony. "This is where a knight alighted who jumped from an upper window at the sacking of the castle by the French. The foot print will be found in the balcony in Heidelberg." There are in the square several statues, or statuettes, and among them one of Marshal Wrede, who led the Bavarian forces as late as 1813. In another part of Mr. Peteler's grounds the sea water is let in by pipes and forms an artificial lake, in which tide rises and falls. Upon a promontory which juts into the lake is the beautiful castle of Hohen-Schwangen. Its towers are nearly ten feet high, and with its cluster of buildings it is picturesque and beautiful. On another bank of the lake is the castle of Sunneck. — *Boston Herald.*

The End of Natural Gas in China. — Two hundred years ago in China there was just such a craze about natural gas as we have in this country to-day. Gas wells were sunk with as much vim and vigor as the celestials were capable of, but owing to a gas explosion that killed several millions of people and tore up and destroyed a large district of country, leaving a large inland sea, known on the maps as Lake Foo Chang, the boring of any more gas wells was then and there prohibited by law. It seems, according to the Chinese history, that many large and heavy-pressure gas wells were sunk quite near to each other. Gas was lighted as soon as struck, as is done in this country. It is stated that one well, with its unusual pressure, by induction or back-draught, pulled down into the earth the burning gas of a smaller well, resulting in a dreadful explosion of a large district, destroying the inhabitants thereof. Lake Foo Chang rests on this district. The same catastrophe is imminent in this country, unless the laws restrict further developments in boring so many wells. Should a similar explosion occur there will be such an upheaval as will dwarf the most terrible earthquakes ever known. The country along the gas belt from Toledo, through Ohio, Indiana and Kentucky will be ripped up to the depth of 1,200 to 1,500 feet, and flopped over like a pancake, leaving a chasm through which the waters of Lake Erie will come howling down, filling the Ohio and Mississsppi valleys and blotting them out forever. — *Cincinnati Commercial Gazette.*

The Air of Sewers. — Professor Carnelley, D. Sc., and Mr. Haldane, of University College, Dundee, have been investigating the impurities of sewer-air, and find that the organic acid in the sewers examined was about twice and the organic matter three times that of the outside air, whereas the number of micro-organisms was less. As regards the quantity of these three impurities the air of the sewers was better than the air of naturally-ventilated schools, while even mechanically-ventilated schools were more polluted with organic matter. The sewer-air contained a much smaller number of micro-organisms than the air of any class of house, and the carbonic acid was rather greater than in the air of houses of four rooms and upwards, but less than in two and one-roomed houses. As regards organic matter, however, the sewer-air was only slightly better than the air of one-roomed houses, and much worse than that of other classes of houses. The amount of carbonic acid found by the observers shows that the sewers observed were better ventilated than those investigated by previous observers. They attribute the excess of carbonic over that of the outside air chiefly to oxidation of organic matter in the sewage and the air of the sewer. The excess of organic matter is probably chiefly gaseous, and derived from the sewage itself. The micro-organisms in sewer air come entirely, or nearly so, from outside, and are not derived, or only so in relatively small numbers, from the sewage itself. This important conclusion is proved by the facts that the average number of micro-organisms in sewer-air was less than in the outside air, namely, as nine to sixteen; that the number increased with the efficacy of the ventilation; that the average proportion of moulds to bacteria in sewer-air was almost exactly the same as in outside air at the same time, whereas one would expect the proportion to be very different were the outside air not the source from which they were derived, seeing that such a difference has been proved to exist in the air of houses and schools. Another consideration is that the filthiness of a sewer seems to have no influence on the number of micro-organisms. Further experiments in the laboratory showed that the number of micro-organisms in sewer-air is diminished nearly a half in passing along a moist tube five feet long and one-and-three-fourths inches in diameter, at a rate of nearly one foot per second. There was, however, distinct evidence of the occasional dissemination of micro-organisms from the sewerage itself; especially in splashing, owing to drains entering the sewers at points high up in the roofs. It is therefore important that drains should be arranged to avoid splashing. The authors' conclusions tend to make one more doubtful of the supposed evidence of the bad effects of ordinary sewer-air, when not vitiated by splashing.

A Pneumatic Tube to Europe. — Col. J. H. Pierce, of Saithington, who has been studying the use of pneumatic tubes, has reached a point at which he hopes to show that a tube across the Atlantic can be used. Following is a description of the apparatus as he conceives it: The tubes will always be in couples, with the currents of air in one tube always moving in an opposite direction from the other. The heaviest cannon will serve to illustrate the tube. A car takes the place of the charge, the tube to be indefinitely continuous and the speed of the car to be governed by the rapidity with which air can be forced through. Time is required to establish a current of air flowing with great swiftness through a tube perhaps thousands of miles in length, but when once created the motion will be nearly uniform. The speed of the current may be made as great as may be desired by using the steam driver fans employed in blast-furnaces. Niagara Falls could drive blast fans and furnish motive power to keep in motion the trains to connect this continent with the old world. The temperature within the tube may be regulated by passing blasts of air entering the tube through furnaces or over ice. The speed attainable may reach 1,000 miles an hour. The tube lining and car exterior would be of polished steel with corrugated sides matching with wheels provided with anti-friction bearings. The speed, owing to the curvature of the earth's surface, will tend to overcome all weight, and the pressure will be upon the upper part of the tube; thus there is scarcely any limit to the speed attainable. The inventions consist in the details of the work. — *Hartford Courant.*

TRADE SURVEYS

The trade conditions are more favorable to-day than thirty days ago. A heavier demand than was anticipated has been experienced in all trade channels. The conservative management of manufacturers and merchants has done very much to maintain the present healthy and steady trade conditions. Prices in some lines have advanced ten per cent. Orders for certain staple products have grown beyond expectations. Business is gratifying, and the prospects for August are more favorable than were anticipated only two weeks ago. One of the powerful, but not visible agencies is the demand for machinery of every kind, and motive-power, rolling-stock, mining equipments, and agricultural and mining tools and appliances. An extended inquiry among these interests develops the very encouraging fact that all establishments are sold up for from two to three months, and that new business is presenting itself constantly. The progress made in the production of superior grades of steel has something to do with the activity in iron and steel channels. Our progress in this direction within two years has attracted the attention of home and foreign governments and of large users of steel for guns, ships, and other purposes where large homogeneous casts are demanded. Our steel works are surpassing foreign competitors in quality, as they long since did in the production of a superior iron and steel rails. Were it possible to present the statistics of machinery and equipment output it would surprise every one connected with the industry. The expansion is extraordinary. There is, perhaps, not a railroad in the United States but what has orders out for rolling-stock and track or shop material and supplies. The locomotive and car builders have recently advanced their prices on first-class work, as the pressure for prompt delivery is greater than for years. The demand for machine-shop equipments has grown to very large proportions. Lathes, cranes, boilers, engines, everything which goes into machinery-making is wanted faster than present capacity can deliver.

The general business of the country is on a solid basis. There are no symptoms of weakness. Money is abundant. The reported volume of business in thirty-eight cities is eleven per cent ahead of what it was for same date last year. Railroad earnings show a most favorable comparison. Speculation is stagnant. Legitimate enterprise is in the saddle. Investments are being made rapidly and safely in all the leading avenues of activity. Good earnings are the rule. Failures are few. Collections are for the most part easily made. Merchants large and small are doing a good and safe business. The sheriffs have but little to do. Mortgages to avoid disaster are exceptionally few. Litigation is at a lower point than for many years between business men, and the efforts made to establish private boards for the settlement of trade differences are meeting with encouraging success. The barbarous methods of law courts are driving many into arbitrative devices. The wood-working industry and the wood-working machinery interests have an excellent season before them. The iron and steel makers anticipate an autumn advance in prices. Orders for all kinds of material are coming in without undue solicitation. Rail-making and bridge-building will be the most active lines. The fifty banked-up blast-furnaces will soon be blowing. Several new rolling-mills will be in operation in September. One hundred new pots for glass-making will be in. Shop-capacity representing 20,000 men will be placed in running shape between September 1 and November 1. The lumber trade is gaining every week in distribution and in prices.

Heavy fall and winter contracts are now being placed for spruce, white and yellow pine and hemlock, besides hardwoods. Stocks at Atlantic-coast points are large for the season. There are urgent river and lake tonnage requirements, and all yards are receiving orders for crafts, big and little. The size of some of the recently-ordered crafts is limited only by the harbor and wharf capacity. It is evident that the influences at work are widening demand rather than restricting it. The authority of some of our most experienced architects can be had for this statement. Whatever the next year may have in store it is safe to say that from the present indications there will be no idle manufacturing-capacity, no idle building-labor, and no idle, or partially-employed capital beyond the usual reserve. High banking authorities say that the demand for funds will be exceptionally large during the next four months, and that railway bonds and stocks will attract greater attention than in former years, because of the generally favorable condition of traffic and trade.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

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ARCHITECTURAL SHEET-METAL WORK.

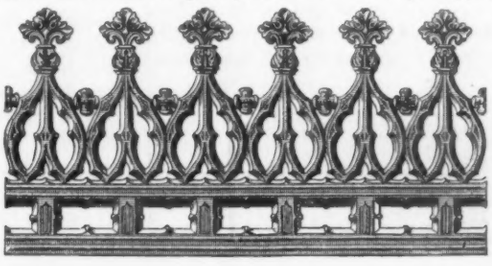
We have just published the fifth edition of our catalogue of sheet-metal architectural ornaments and statuary, and we wish to call the special attention of architects and "the trade" to the great number of new and beautiful designs added since our last issue of 1884.

Our stamping department, which was destroyed by fire on March 5, 1886, has been rebuilt with more than double its former capacity, so that, with our present facilities for manufacturing this class of work, we can promise prompt and careful execution of all orders given to us. We have also more than doubled the capacity of our spinning department.

The designs of sheet-metal statues, figures, etc., shown in this catalogue are a few selected from works recently executed by us. In perfection of modelling and beauty of outline, together with careful treatment of detail, they produce in sheet-metal works of real artistic merit. All statuary made by us is thoroughly and securely braced on a framework of iron, thus securing the greatest stability with the minimum weight, a statue of Justice, eight feet high, weighing about one hundred and thirty pounds. We have in our employ some of the best designers and modellers in the country, and they, together with our large corps of skilled workmen, enable us to guarantee artistic treatment and perfect workmanship.

We have aimed in this edition, as we have in all previous issues, to illustrate only such designs as will meet the popular demand, avoiding all special designs not universally applicable. The size of each ornament is given in connection with the cut of same, and all engravings being made from photographs of the work itself, accurate representation is thus secured. Zinc, on account of its cheapness and great durability, is most commonly used for ornamental sheet-metal work, and is the material upon which the prices in this catalogue are based. We are prepared, however, to furnish any work herein described, made in either brass or copper, and will be pleased to quote prices on the same upon application.

No. 2386.



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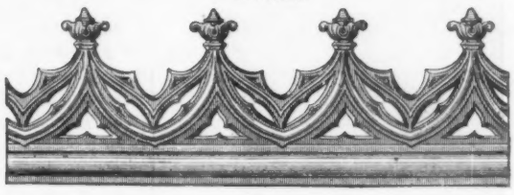

No. 2380.

We would call the attention of architects and others to the use of sheet-metal work for interior decoration for public buildings, theatres, churches, cathedrals, etc. By its use there is secured at a low cost the effect of any desired style of ornamentation, at the same time making perfectly fire-proof construction.

No. 2394.

No. 2389.

No. 2393.

No 2387.

Architectural Sheet-Metal Work.

We also desire to call the special attention of our patrons to the telegraphic cipher, found at the last of this book, in connection with the index and price-list.

It is our aim to carry in stock all articles shown in this catalogue, but it is impossible always to have a complete stock on hand. We therefore request our patrons to send their orders as early as they can to avoid delay.

We show above a few of our latest designs for roof-crestings, which will serve also as samples of the hundreds of cuts with which our catalogue is illustrated.

BAKEWELL & MULLINS.
SALEM, OHIO.

SIMPLE SEWER CATCH-BASIN WATER-CLOSET.

The attention of architects, builders and house owners is called to a simple substitute for water-closets now in use for out-of-door purposes. It is a basin built of brick, and cemented so as to be water-tight, with no valves, cranks, or levers to get out of order, and is deep enough to keep from freezing. It can be built so as to accommodate any number of seats. The house over it is built the same as it would be over any ordinary privy-vault. By referring to the cut its operation can be seen. The waste water is discharged into basin A, through pipes MM, whether it be yard or sink waste or roof water (the more the better), it fills the basin up to overflow E, when it passes through pipe O, trap D and pipe L to sewer, carrying the nuisance with it at the same time. The object of retaining this amount of water in the basin is to prevent the nuisance piling in any one spot and also to allow it to dissolve and pass off readily through E.

The trap D prevents the gas from sewer entering basin. The basin can be emptied en-

tirely at any time by lifting pull F, which raises flag G in the bottom of basin.

The trap D, and the pipe leading to sewer can be forced by inserting plunger P, thereby saving digging down to same.

The following are a few of the advantages of using this basin:

It affords a ready means of getting rid of all the waste water about the house, while at the same time good use is made of it.

There is no water rent to be paid as for ordinary water-closets. No privy-cleaning bills, and as there are no water connections and no freezing, consequently no plumbers' bills to be paid. While the cost of them is about the same as an ordinary privy-vault, and they are as durable as the building.

Estimates for the building of this basin and also sewer work, privy drains, etc., will be gladly furnished on application to the undersigned patentee and builder.

J. A. SULLIVAN,
206 CENTRAL AVENUE, CINCINNATI, O.

The A. A. Griffing Iron Company of Jersey City writes us that their trade is opening up very satisfactorily, and that they are crowded with orders. They make special mention of the fact that inside of a month they have had large orders from the City of Mexico; Chefoo, China; Tokyo, Japan; Milano, Italy; Berlin, Germany; London, England; and Edinburgh, Scotland.

THE DROP TUBE MAGAZINE BOILER.

The advantages of steam heating are numerous. We shall sum them very briefly:

Steam gives a mild, regular heat. It does not bake one as a furnace does. It can be put exactly where it is wanted. It is just as warm in the morning as at night, because with a good Magazine Boiler the fire stays all night.

There is no danger of fire from its use, and, with our boiler, there is none of explosion.

The only objection to steam is its cost. In reply to that we say the saving in fuel is sufficient to pay the interest on the extra cost, and have something left besides.

We offer the McNeil D.op Tube Magazine Boiler in the full conviction that no better boiler exists. It is built of steel in all parts exposed to the action of the fire, except the tubes. The drop tubes are the best quality of steam pipe.

There is no cast-iron used as a part of the boiler, and there is none exposed to the action of the fire, except the grate. The boilers are tested to 150 pounds hydraulic pressure before they leave the works.

We offer it as a distinctively *soft coal* boiler, but it will work equally well on hard coal or coke, without change in the construction.

One of the great troubles with some other makers is that they overrate the capacity of their boilers. We wish to caution the buyer to get a boiler which is large enough to do the work easily. A smaller boiler will oftentimes do the work, but it will be at much added expense for fuel and attention.

We rate our boiler at what we consider to be the best capacity for good and economical work.

Our boiler is so arranged that there is no necessity for gas escaping into the cellar.
furnish directions for operating which can be comprehended by any one of ordinary intelligence, and when they are followed we will guarantee that there will be no trouble from gas. This is one of the great disadvantages of other boilers, and here we claim superiority.

We do not attempt to compete with cast-iron boilers on cost. We can only say that in the past we have replaced cast-iron boilers with ours, and have yet to hear of an instance where cast-iron has displaced us.

To people who live in a soft-coal country, we can say, do not pay a large price for hard coal when our boiler will do your work for one-half or one-third of the cost of hard coal.

To those in the hard-coal region, we say that our boiler is as good as any for your fuel, and on the question of gas in the cellar, is better.

We make these large claims for our boiler while fully aware that every one else makes the "best in use." We know what we are talking about when we say our boiler is the best, and we are prepared to substantiate every statement we make.

There is no trouble from the flues clogging with soot. The air pipe in the magazine is a very good feature. By its use, in warm weather, the grate may become wholly clogged with ashes and still the fire will burn. It also burns the fire in the centre and makes the coal feed down evenly.

The boiler does not require attention oftener than twice in twenty-four hours in the coldest weather, when the boiler is of the right size. All the heating-surface is exposed to the direct action of the fire, hence it makes steam very rapidly.

We believe in making a good boiler, which will recommend itself when it is tried.

The first McNeil Magazine Heating Boiler was built in 1875. It was used by the late Mr. McNeil in his house, and was one of the Horizontal Tube style. This was experimented upon and improved, and several were built. All were run on soft coal. In 1879 it was patented. The central air-tube was an early improvement.

In 1880, in response to a demand for a cheaper boiler — the great objection to the Horizontal Tube style being its cost — the Drop Tube Magazine Boiler was produced. It was entirely Mr. McNeil's own invention. This was without the water jacket. It was patented in 1881.

In 1882, he first put a water-jacket around the tubes, and finding it to be good, it was adopted as a permanent feature in 1884, and patented in 1885.

The magazine top was the subject of numberless changes and experiments. He finally brought it to its present perfection.

In the spring of 1885 a demand arose for a Horizontal Tube Boiler for hard coal. The old plans were remodelled and several were built in the style represented in the cut, shown in our advertisement last week, and are now being used with eminent success.

Mr. J. C. McNeil died November 26, 1885. His heirs have formed a company to continue the business, with his son as manager. We are not resting idly on Mr. McNeil's reputation. While we think he has brought his boilers to a point as near perfection as one man could do, we are striving in every way to improve them. It is hard work to find anything to improve. The public may rest assured that when anything feasible presents itself they will immediately get the benefit of it. Meanwhile we offer a boiler which we are fully confident will answer every just demand put upon it.

THE J. C. McNEIL CO.
AKRON, OHIO.

THE FLORIDA STEAM-HEATER.

This season of year, and from now till cold weather, will be utilized by prudent people in the selection of systems of heating, and the more prudent the earlier will they decide and set the mechanics at work on the erection of the heating-plant they select. The Florida heater, which we illustrate in this issue, has many points of excellence, and is claimed by the manufacturers, Messrs. Pierce, Butler & Pierce Mfg. Co., of Syracuse, N.Y., to be cheap, requiring no brick, easily handled — being sectional, self-feeding or surface-burning — is portable, and occupies little space in the cellar, and that it will carry steam continuously, and is econominal of fuel. The water is confined in narrow spaces and the heat acts upon both sides of each space. It circulates vertically over the fire surface in each section independently, and is held in close contact with the fire until it escapes upward in the form of steam, and the construction of the combustion-chamber is such that the gases are all consumed.

The manufacturers state that the Florida steam-heater was the pioneer of portable cast-iron steam-heaters, and was designed to meet the popular demand for a steam-heater of small cost that would be safe, durable, effective and economical. Its merits were promptly recognized, it having so reduced the cost and complications of steam-heating, that the average house-owner was able to enjoy the comforts of a steam-heated home.

In domestic steam-heating, safety under all possible circumstances of neglect and mismanagement is of the first importance, and here it is claimed that the material and manner of

manufacture preclude the possibility of explosion, and we are informed that it has been proven many times, by the severest tests possible, that it is an impossibility to explode the cast-iron water-sections of which the Florida steam-heater is constructed. They are not made of *common* cast-iron, but are cast from a most carefully mixed combination of ores, producing an iron of great tenacity and most desirable for steam-making purposes, both on account of being good conductors of heat and the less liability to corrosion during the portion of the year when not in use. This heater is formed of three or more hollow cast-iron water-sections of circular form, with six oval-shaped return flues and three water-way openings cast in each. These openings in the sections when set up come in line and form the perpendicular return flues of the heater, and the water and steam communication between the sections. The bottom section, upon which the water-sections rest, is of smaller diameter, and is, in operation, exactly like the water-back of a kitchen range, made in circular form, and not divided, but circulates freely the feed-water and that of condensation through its open top ports to the water-sections above, which, being of larger diameter, overhang it on its outer circumference.

The inner circumference of the water sections are corrugated, and by this means expose a large area of water-surface directly to the most effective part of the fire. Every section, is thoroughly tested under high pressure to avoid any possibility of imperfections. They are faced off around each water-way opening, on each side where they come together, and a most perfect joint is secured by use of thin asbestos gaskets between each of the sections at these points; through each of these three perpendicular water-ways passes a three-quarter-inch selected steel bolt, by which the sections are securely bound together; these bolts being exposed simply to the heat of the water, there is a compensation in the expansion and contraction of the different metals so that these joints cannot leak.

The sections, bolted together, set upon the base casting, and are surrounded with two jackets of No. 20 iron, the inner one black and the outer one galvanized, leaving an air-space of from one and one-half to two inches between them. First, however, there is a cast-iron sectional jacket-ring, about six inches high, placed around the sections resting upon the base. In this casting are hand-hole doors to allow cleaning the soot out as it is brushed from the flues. The jacket rests upon this, and is held in place with iron bands at top and bottom made tight with draw-screws. For the purpose of conveniently cleaning the flues, small holes connecting with return flues are cast through the steam dome, which are closed by iron stoppers. Through these holes the soot is easily brushed down into the soot-chamber, and is removed through the hand-hole doors in jacket-ring without hauling fire or interfering with the working of the heater. At the back side of the heater is a cast-iron smoke connection for the purpose of taking an indirect draft from the boiler. In this smoke connection a check-draught door is arranged, to which the damper-regulator is connected. In the base-casting is a draught door (which is also connected with the draught-regulator) and a wide ash-door for cleaning the ash-pit. The fire is controlled by an automatic-regulator, which is attached to the draught door and check-draught, and can be set to carry any pressure that may be desired.

A low-pressure safety-valve attached to the steam-dome makes an overpressure of steam impossible, and a water column with water-gauge always shows through its glass the true height of water in the heater. A steam-gauge indicates the amount of pressure carried, and can be used to govern the setting of the re-regulator and safety-valve, to close draught, and blow off at any desired pressure. The fire is in the heart of the heater, and comes in direct contact with the lower sections. The centre of the fire is from ten to fifteen inches thick (according to the size of the heater), and slopes off from the magazine to the sides, so that as the fire gets low the ashes do not lay against the fire surface and destroy its effectiveness. The products of combustion pass up through the centre of the heater, turn outward at the dome, and descend through the return flues, and then ascend on the outside between the water-sections and the jackets; baffle plates being placed so as to turn the heat to the front, and then to the back into the chimney, thus utilizing every inch of the heater as effective heating-surface.

This heater is practically a self-feeder, but the wide-mouthed door opening onto the surface of the fire admits of the usual method of feeding a surface fire when preferred. In point of economy, the construction of the Florida presents many strong points. The grate is simple in construction, easy to shake, and not liable to dump when shaking alone is intended. We have dwelt thus at length on this valuable heater in order to point out its many merits to our readers, but for further particulars, we refer to the manufacturers, who will take pleasure in supplying any needed information requested by our readers.

PIERCE, BUTLER & PIERCE MANUF'G CO.,
SYRACUSE, N. Y.

THE LAUNDRY.

THE fact that most first-class houses, flats, and even smaller hotels, hospitals, and public institutions of the present day, are either very poorly or not at all provided with suitable drying-apparatus or laundry-stoves of merit is apparent to the most casual thinker.

Inasmuch as "cleanliness is next to Godliness," we insist that the modern architect and builder falls far short of a manifest duty, when, as is generally the case, he passes over the laundry-room of a client with merely a wave of the pencil. Nor is such neglect necessary, or, for the future, even excusable, as the most casual examination of the merits of the stove and drying-apparatus hereinafter mentioned, will convince a mechanical mind of its intrinsic worth for all the work of the laundry — of its economy in space and of its ability to save its cost to the client or owner, in the way of wages to help.

To the Chicago Laundry Dryer Company belongs the credit of producing not only the finest stove for laundry work that is now on the market, but also of utilizing the heat thereof for drying clothes. The latter work can be accomplished as fast as the clothes can be washed, and with the same fire necessary to boil the clothes.

The closet, or drying-chamber, is built in basement or top-story room, designed for laundry purposes, and is constructed of bricks, galvanized-iron, or any fire-proof material, and is from five-and-one-half to eight feet long by three to seven feet wide, and is furnished with hot-air drums at the base: cold air being admitted underneath them, is heated, passes up through the clothes, and is drawn back from the top of the closet into the stove through moist-air tubes connecting with an under draught, and passes out through the flue. The clothes-horses admit of spreading out the clothes in a most admirable manner, and are worked independently of each other.

The stove is the result of years of study, and is perfect. It weighs 500 pounds with, and 375 pounds without, a water-back. It can be accommodated to any sized wash-boiler; will heat from one to fifteen flat-irons; supply enough hot water from water-back for the smallest family or a large hotel, and withal burn very little fuel. The stove claims a manifest advantage over every other laundry stove in that it only stands twenty-six inches high and never fails to captivate the laundress.

This combined device is not only a perfect success after years of trial, but is highly sanitary in its capacity as a dryer. A perfect and constant circulation of pure, dry, hot air is the only agent used for drying, and the process only takes from ten to forty minutes, or faster than they can be washed. Moreover, if the clothes are properly washed and thoroughly rinsed, they will come out after this quick drying as white as snow, and such is the verdict of hundreds who have used the apparatus for years.

This apparatus can be made any size and to suit almost any space. Regular sizes run as follows:

Number 4, containing 120 feet of line, being 3 feet 1 inch wide by 7 feet long.

Number 5, containing 150 feet of line, being 3 feet 8 inches wide by 7 feet long.

Number 6 containing 180 feet of line, being 4 feet 3 inches wide by 7 feet long.

Number 7, containing 200 feet of line, being 4 feet 10 inches wide by 7 feet long.

And so on with an increase of 30 feet of line per size and 7 inches per size in width — length the same, unless otherwise desired. Made any height desired.

We are prepared to ship them to any part of the United States.

Send for catalogue. Correspondence solicited.

CHICAGO LAUNDRY DRYER COMPANY,
218 LA SALLE STREET, CHICAGO, ILL.

STAINED GLASS.

THE nineteenth century has witnessed great advancements in the art of making stained-glass windows. The recent improvements in the manufacture of colored glass enables the artist of to-day to reproduce his designs in glass without the aid of enamels or heavy brushwork; the result is in increased brilliancy and gem-like quality of his work. But in order to put his designs in glass the artist must have an especial training for it, and give his personal supervision to the work; and it must be so in the *best* art-work, for no one can interpret our ideas as we ourselves can.

When, therefore, artists who have had a long and careful training in their specialty, personally attend to the reproduction of their designs, the conditions are favorable for the very best work.

Our productions point to just such conditions.

Careful training in every department of art stained glass, and personal attention to every detail of the business enables us to turn out excellent work. By an invention in glass mosaics, which we have patented, we can reproduce the most beautiful designs without the aid of brushwork.

We also manufacture brass and copper faced glass mosaics for hall-lanterns, etc.

BRAY & BRECK STAINED GLASS WORKS,
35 AND 37 PROVINCE STREET, BOSTON, MASS.

FACTS FOR ARCHITECTS.

Architects are expected to know all about the construction of buildings, but there is one thing which they have not learned, which is, that a foundation for the support of the paint pigment of the exterior painting is quite as essential as the wall is for the support of the structure itself.

The grain of the wood must be completely filled with linseed oil, or its equivalent, so as to bear out with a gloss before the paint is applied; then the paint will oxidize upon the surface holding combined the oil which will never scale off.

Mr. Asahel Wheeler's Marine Varnish performs this office most effectually by one coat applied clear, and a second coat with some pigment added; under a test of eight years' exposure to the weather it has proved itself to be the desirable thing for this purpose.

Owners of real estate find fault because of the indurability of paint, and the architect appearing wisely excuses himself under the shadow of the painter or the manufacturer of the paints, when investigation will prove that ignorance of the subject is the reason why his patrons are not better served.

Millions of dollars are absolutely wasted annually in painting as our forefathers have done before, and as the present generation is ow doing.

It is not the desire of the real estate owners to be thus wasteful, but to be shown a more economical way, and since the architect is his architectural adviser much depends on him.

Disclaiming all desire to be censorious, let us unite our efforts to improve the condition of things in this line.

Asahel Wheeler.
145 Milk St., Boston.

EUROPEAN ESTABLISHMENT.

In the course of the rapid growth of the business of the New York Belting & Packing Co., manufacturers of rubber belting, packing, hose, and general rubber goods for mechanical purposes in New York, it has been found necessary to establish a branch depot at Hamburgh. Messrs. Persicaner & Co., Pickhuben 5, have been appointed general agents, and will carry a full stock of our well-known goods. Hamburgh is a free port of entry, and will be used as a distributing point for other continental markets.

METALLIC SHINGLES.

New Bedford, Mass., June 24, 1887.

To National Sheet Metal Roofing Company, New York, N. Y.:

The metallic shingles which were put on by you on the roof of the new Bristol County Jail and House of Correction at this place are entirely satisfactory in every respect, the manner in which the plates are rolled overcoming all objections to the expansion and contraction of the metal. Those that were put on here were of hard rolled copper, and have now turned a beautiful bronze color, and are very much admired by all who have seen them. The roof cannot but be an extremely durable roof, and I do not see that it can need repairs of any kind for years to come.

Very truly yours,
Robert H. Slack, *Architect.*

New Bedford, Mass, June 24, 1887.

To National Sheet Metal Roofing Company, New York, N. Y.:

We merely write to say that we fully concur in the opinion expressed by the architect in regard to the copper metallic shingles which we had put on the roof of the new Jail and House of Correction just built in this city.

Franklin Gray,
Henry A. Thayer,
County Commissioners.

The above letters recently received are but a sample of the gratifying reports constantly made on these shingles. Architects, builders, contractors, and house-owners should send for further particulars, circular, etc., to the manufacturers.

THE NATIONAL SHEET METAL AND ROOFING COMPANY,
510-520 EAST TWENTIETH STREET, NEW YORK.

NOTES.

The sales of boilers by the Babcock & Wilcox Co. for May and June are as follows: Gordon, Strobel & Laureau, Philadelphia, seventh order, 292 horse-power; S. D. Kendrick, Glen Falls, N. Y., 51 horse-power; Swift M'f'g Co., Columbus, Ga., third order, 292 horse-power; Gordon, Strobel & Laureau, Philadelphia, eighth order, 1248 horse-power; Luray Cave & Hotel Co., Luray, Va., 45 horse-power; Mineral Railroad & Mining Co., (Luke Fidler Colliery), Shamokin, Pa., 240 horse-power; Mineral Railroad & Mining Co., (Cameron Colliery), Shamokin, Pa., 240 horse-power; Solvay Process Co., Syracuse, N. Y., third order, 832 horse-power; Pennsylvania Steel Co., Baltimore, Md., second order, 3840 horse-power; Columbus Buggy Co., Columbus, O., third order, 250 horse-power; Springville Co., Rockville, Conn., 244 horse-power; White M'f'g Co., Rockville, Conn., 136 horse-power; Pencoyd Iron Works, Pencoyd, Pa., fourth order, 156 horse-power; D. S. Cook, Princess Furnace, Glen Wilton, Va., 312 horse-power; George Westinghouse, Jr., Pittsburgh, Pa., 170 horse-power; Bucyrus Gas Light & Fuel Co., Bucyrus, O., 85 horse-power; Ch. Jacquin, New York, N. Y., for Knickerbocker Cottage, 25 horse-power; M. Camacho Roldan and nephew, New York, N. Y., for Mexico, 122 horse-power, making a total of 8580 horse-power.

There is one advertiser in the *American Architect* who, it seems to us, knows how to act in prosperous and booming times as well as in times that are dull. In dull times the common argument with the man who does not know how to advertise is: "Times are so dull that I can't afford to advertise." When prosperity is upon him he says: "Oh, I don't need to advertise, I have more work already than I can attend to." But a shrewd and observing advertiser like Josephus Plenty, 144 Pearl Street, New York City, when he has secured a good trade through judicious advertising does not feel that advertising is no longer essential to his success, nor does he seek to cancel the contracts already made on the plea that they will only bring him too much trade. No, Mr. Plenty simply changes the wording of his card, and for months past he has been saying to the readers of the *American Architect* that "*no orders can be taken for erection before September. Order-books filled to that date.*"

This statement seemingly implies several things, amongst them that Mr. Plenty deals in an article so good that he has secured for it a demand that keeps his orders ahead of his work; also, that he is a reliable man and does not propose to undertake work that he cannot accomplish as promised; that he does not mean that his business shall come to an untimely end through thinking that he can advertise enough in a month to last him for a year; in short, that he understands what advertising really means, that, if it is to accomplish as much as it can, it must be persistent and uninterrupted even if it be not very conspicuous.

In the United States Circuit Court for the first circuit, at Boston, Colt, J., a final decree for an infringement and accounting was entered on the third Monday of February last, in the suit of the Bridgeport Wood Finishing Co. *vs.* Asahel Wheeler, in equity. This decree affirms the validity of the Wheeler patent, and restrains infringement thereof by the use of ground silex in wood fillers.—*Scientific American.*

Millions of dollars are annually lost by the present wasteful system of painting, which can be avoided by the employment of Asahel Wheeler's Marine Varnish in priming and filling the grain of the wood before painting. It is a sure preventative of cracking or scaling, and greatly increases its durability.

BUILDING INTELLIGENCE.

Reported for the American Architect and Building News.

ALTERATIONS.

Boston, Mass. — *Shawmut Ave.*, cor. Union Park, alterations; cost, $10,000; owner, Dr. W. S. Whitmore; builder, R. O. Dunn; architect, Alden Frink.

Dover St., cor. Emerald St., alterations; cost, $10,000; owner, Frank W. Boles; builder, J. S. Potter; architect, Alden Frink.

Carver St., No. 1, alterations; cost, $8,000; owner, Mr. Gilbert; builder, R. O. Dunn; architect, Alden Frink.

Tremont St., No. 162, alterations; owner, George Farrer; builders, McNutt & Jacobs; architect, J. P. Rinn.

Boylston St., No. 87, cor. Providence St., alterations; owner, Bay State Trust Co.; builders, David Connor & Son and B. D. Whitcomb; architect, Carl Fehmer.

Tremont St., Nos. 165-166, new brick offices and stores; owner, Mrs. B. E. Hastings; builders, Lyons & McClellan; architect, Carl Fehmer.

Brooklyn, N. Y. — *Congress St., No.* 147, alterations and additions; cost, $3,500; owner, C. F. A. Hinrichs, 367 Henry St.; architect, S. R. Goodsell; builders, J. J. Bentzon and S. R. Goodsell.

Vanderbilt Ave., n w cor. Butler St., additions; cost, $40,000; owner, Board of Education; architect, J. W. Naughton; builders, F. J. Kelly and Morris & Selover.

Lafayette Ave., n w cor. South Oxford St., additions; cost, $3,000, owner, Oxford Club, on premises; architect, J. Mumford; builders, J. Ashfield & Son and W. S. Wright.

Broadway, s e cor. Bedford Ave., additions; cost, $15,000; owner, Millard Smith; architect, W. H. Gaylor; builders, W. and T. Lamb.

Jersey City, N. J. — Interior alterations and additions to First National Bank of Jersey City; cost, about $50,000; architect, D. Lienau.

St. Louis, Mo. — One-st'y brick addition; cost, $4,000; owner, M. C. Barthell; architects, A. Beinke & Son; builder, C. Wehking.

APARTMENT-HOUSES.

Boston, Mass. — *Dudley St., No.* 675, cor. Magnolia St. and Alexander Ave., six-st'y brick apartment-houses, 133′ 8″ x 81′ 11″; owner, Willard White; builder, Jas. Fagan.

Broo lyn, N. Y. — *Myrtle Ave.*, s w cor. Clinton Ave., four-st'y brick flat, tin roof; cost, $25,000; owner, John Englis, 196 Clinton Ave.; architect, G. M. Walgrove.

Myrtle Ave., s s, 60′ w Clinton Ave., 2 four-st'y brick stores and flats, tin roofs; cost, each, $8,000; owner and architect, same as last.

Sixth Ave., n w cor. Fourth St., three-st'y brick store and flat, tin roof; cost, $7,000; owner, W. W. McCormick, on premises; architect and builder, T. McCormick.

Sixth Ave., w s, 20′ n Sixth St., 4 three-st'y brick flats, tin roofs; cost, each, $6,000; owner, M. A. McCormick, on premises; architect, same as last.

Chicago, Ill.—T. Caughlin, 3 three-st'y stores and flats, Van Buren St.; cost, $12,000; architects, Holabird & Roche.

B. Kelly, three-st'y store and flats, Division St.; cost, $9,000; builder, F. Kirchiff.

S. Helmecke, two-st'y flats, Wallace St.; cost, $4,300; architect, J. Frank.

Mrs. R. Page, three-st'y store and flats, Cottage Grove Ave.; cost, $5,000; architect, L. G. Quackenboss.

R. Peacock, three-st'y store and flats, State St.; cost, $14,000; architect, W. Thomas.

Mrs. Burns, three-st'y flats, North May St.; cost, $6,000; architect, C. E. Lohman.

Lewis & Fetter, 2 three-st'y stores and flats, Ogden Ave.; cost, $16,000; architect, A. Smith.

A. J. Welin, three-st'y flats, Fifth Ave.; cost, $5,000; architects, J. F. & J. P. Doerr.

J. Erverts, three-st'y flats, Fifth Ave.; cost, $11,000; architects, J. F. & J. P. Doerr.

A. Svensen, two-st'y flats, Fifth Ave.; cost, $4,000; architect, J. Otter.

CHURCHES.

Olean, N. Y.—$16,000 has been donated for the building of a new stone church here to cost $25,000. It will occupy the site of the old St. Stephens Episcopal Church; architect, not selected.

Somerville, Mass. — The Prospect Hill Society are

soon to build a brick church at the corner of Bow and Walnut Sts., to cost about $20,000.

FACTORIES.

Boston, Mass.—*Neponset Ave.*, near Bourne St., Ward 23, frame factory, 100′ x 25′; owner, Am. Cond't and Constructive Co.

Brooklyn, N. Y.—*Washington St.*, n w cor. Water St., six-st'y brick factory, gravel roof; cost, $25,000; owner, Robert Gair, 161 Chambers St., New York; architect, B. Finkensieper; builder, not selected.

Moore St., n s, 221′ e Bushwick Ave., three-st'y brick sash and blind factory, felt roof; cost, $5,000; owner, Michael Mayers, Ellery St.; architect, T. Englehardt; builders, J. Auer and D. Kreuder.

HOUSES.

Boston, Mass.—*Amherst St.*, near Brandon St., frame dwell., 23′ 6″ x 32′; owner, J. McKinley; builders, Duncanson & Marchbank.

Prentiss St., No. 11, 2 three-st'y frame dwells., 22′ x 42′ 6″; owner, Richard Ward; builder, V. Bock.

Call St., near Everett St., Ward 23, frame dwell., 22′ x 39′; owner, John Thorburn; builder, G. A. Cahill.

Sumner St., No. 309, three-st'y frame dwell. and store, 21′ x 49′; owner, Mrs. Mary Larkin; builder, E. J. Turner.

Bennington St., No. 603, three-st'y frame dwell., 21′ x 50′; owner, Wm. Glegg; builder, E. J. Turner.

Dorset St., near Boston St., Ward 15, frame dwell., 23′ x 48′; owner, Elijah Fish.

Wheatland Ave., cor. Kilton St., Ward 24, frame dwell., 28′ 2″ x 44′ 2″; owner, H. Reardon; builder, John Alden.

Washington St., No. 2475, 4 dwells., 50′ x 95′; cost, $22,000; owner, James H. Hayden; builder, W. D. Johnson; architects, Lord & Fuller.

Lombard St., frame dwell., 26′ x 35′; cost, $3,500; owner, A. Woodward; builder, George F. Higgins; architects, Lord & Fuller.

Kingsbury St., frame dwell., 27′ x 50′; cost, $7,000; owner, E. W. Dawes; architect, Alden Frink.

Frankford, Pa.—*Edmund St.*, w s, bet. Faust and Sanger Sts., two-st'y frame building; contractor, Jacob Wenz, 260 Bridge St.

STABLES.

Brooklyn, N. Y.—*Tillary St.*, s s, 50′ e Duffield St., four-st'y brick storage and stable, gravel roof; cost, $10,500; owner, Isaac Mason, 607 Carlton Ave.; architect, W. Josiah; builder, B. E. McAverney.

Eighth St., s s, 65′ w Third Ave., one-st'y brick stable, gravel roof; cost, $300; owner, architect and builder, Wm. Taylor, 83 Third Pl.

Twenty-fourth St., s s, 150′ e Fourth Ave., two-st'y frame stable, tin roof; cost, $400; owner, A. Wolmers, Twenty-fourth St.; builder, D. Zar.

Moore St., n s, 221′ e Bushwick Ave., two-st'y frame (brick-filled) shop and stable, tin roof; cost, $1,270; owner, Michael Mayer, Ellery St.; architect, T. Engelhardt; builders, D. Kreuder and J. Auer.

Quincy St., s s, 80′ w Ralph Ave., two-st'y brick stable, tin roof; cost, $6,000; owner, Police Department; builders, Lahy & Moran and T. Hanlon.

Chestnut Hills, Pa.—*Twenty-ninth St.*, bet. Willow Grove Ave. and Hartwell St., two-st'y stone stable; builder, Wm. C. Mackey, Chestnut Ave.

Thirty-sixth St., cor. Moreland St., two-st'y stone stable; builder, Wm. C. Mackey, Chestnut Ave.

New York, N. Y.—*Fifty-fourth St.*, n s, 150′ w Tenth Ave., two-st'y brick stable, tin roof; cost, $6,000; owner, Philip Hauseman, 174 West Ninety-fifth St.; architects, Ungrich & Hauseman, 1554 Broadway.

East One Hundred and Thirtieth St., No. 55, two-st'y brick stable, tin roof; cost, $8,000; owner, Wm. A. Martin, 130 West One Hundred and Twenty-third St.; architect, Andrew Spence, 2294 Third Ave.

Roxbury, Mass.—*Townsend St.*, brick stable, 40′ x 50′; cost, $7,000; owner, Henry W. Dennison, builder, Mr. Whitmore; architect, Alden Frink, Boston.

STORES.

Boston, Mass.—*Temple Pl.*, brick and freestone store, 36′ x 51′; owner, R. H. Stearns; builders, Stewart & Emery and McKenzie & Hersey; architect, Carl Fehmer.

Boylston and Washington Sts., Boylston building, freestone, 182′ 15″ x 83′ 78″; owners, Boylston Market Association; builders, Woodbury & Leighton and Leander Greely; architect, Carl Fehmer.

Chattanooga, Tenn.—Peoples Bros., brick store building on Market St.; cost, $60,000; architect, J. C. Edwards; builder, H. C. Jackson.

W. A. Posey, brick stores on Carter St.; cost, $41,000.

Plans are being prepared by Adams Bros., architects, for seven-st'y business building cor. Market and Seventh Sts., for East End Land Co.; cost, $250,000.

Chicago, Ill.—F. Madlener, five-st'y store West Lake St.; cost, $18,000; architect, E. Bauman.

G. A. Rawson, one-st'y store Ashland Ave.; cost, $10,000; architect, G. A. Rawson.

New York, N. Y.—*West Thirty-fourth St., Nos.* 648–650, three-st'y brick feed store, tin roof; cost, $14,000; owners, Hoffman & Lounsberry, 648–650 West Thirty-fourth St.; architects, Thom & Wilson, 1267 Broadway.

Philadelphia, Pa.—*Queen St.*, n s, bet. Germantown and Green Sts., two-st'y brick building; owners, Vatson & Robinson, 32-46 Queen St.

TENEMENT-HOUSES.

New York, N. Y.—*Thirty-fourth St.*, n s, 125′ w Tenth Ave., five-st'y brick tenement, tin roof; cost, $13,000; owner, Barbara Simermeyer, 965 Tenth Ave.; architects, Ungrich & Hauseman, 1554 Broadway.

One Hundred and Forty-sixth St., n s, 140′ e Brook Ave., 2 four-st'y brick tenements, tin roofs; cost, $24,000; owner, Wm. Speeker, 183 Third Ave.; architect, R. C. Rogers, 362 Willis Ave.

West Fifty-third St., No. 506, five-st'y brick tenement, tin roof; cost, $9,000; owner, John Schaeffer, 438 West Fifty-third St.; architects, Ungrich & Hauseman, 1554 Broadway.

Eighty-fourth St., s s, 80′ w Ave. B, 4 five-st'y brick tenements, tin roofs; cost, $55,000; owners, George & John Schreimer, 348 East Eighty-second St.; architect, Edward Wenz, 1491 Third Ave.

Morris Ave., w s, 75′ n One Hundred and Fifty-fourth St., three-st'y brick tenement, tin roof; cost, $9,000; owner, Barnhard Stock, 645 East One Hundred and Fifty-third St.; architect, Edward Wenz, 149 Third Ave.

East Seventy-eighth St., No. 348, five-st'y brick tenement, tin roof; cost, $14,000; owner, Edward Burns, 348 East Seventy-eighth St.; architect, Wenz, 1491 Third Ave.

MISCELLANEOUS.

Atlanta, Ga.—From $65,000 to $75,000 will be expended in the building of a new building for the Southern Sanitarium.

Bath Beach, L. I.—George Damen is preparing plans for a two-st'y and attic refreshment and billiard saloon, for Robert T. Mitchell, to cost $5,000, and a two-st'y Queen Anne cottage, with extensions, for Mr. Klein, to cost $5,000.

Bennington, Vt.—Battle monument, 301 ft. high; architect, J. P. Rinn, Boston.

Boston, Mass.—*West First St.*, near B St., frame storage, 40′ x 60′; owner, A. P. Morse; builder, M. Driscoll.

Bet. Village and Emerald Sts., brick Parnell hall, 24′ x 54′; cost, $65,000; owner, Jas. Stevenson; architect, J. P. Rinn.

COMPETITIONS.

SOLDIERS' AND SAILORS' MONUMENT.
[At Indianapolis, Ind.
OFFICE OF THE STATE SOLDIERS AND SAILORS MONUMENT COMMISSION,
INDIANAPOLIS, IND., July 21, 1887.

This Commission will receive at their office in the city of Indianapolis, **on or before the 12th day of December, 1887,** designs and plans and specifications for a State Soldiers' and Sailors' Monument, or Memorial-Hall, or Monument and Memorial-Hall combined, to be erected on the grounds known as Circle Park, in the city of Indianapolis (a city of 100,000 inhabitants and the capital of the State of Indiana), according to an act of the General Assembly of Indiana, approved March 3, 1887, appropriating the sum of two hundred thousand dollars, and directing the expenditure of the same and additional donations for the erection of said structure.

Such plans and designs as are offered will be submitted to thorough examination of a board of three competent experts.

The cost of the structure must not exceed two hundred and twenty thousand dollars.

All plans and designs submitted are to be understood to be subject to the terms, conditions and limitations of the law, and the right of the Board of Commissions to reject the same is hereby reserved.

For further information, copy of the law, diagram and description of the location, rules governing the competition, and instructions to competitors, etc., apply to the Secretary.

GEORGE J. LANGSDALE, President.
JAS. F. GOOKINS, Secretary. 608

ROMAN CATHOLIC CHURCH.
[At New Iberia, La.]

Sealed plans and accompanying detailed specifications are invited and will be received **until 1st of September,** for a Roman Catholic Church to be erected in New Iberia, La. The same shall be for either a brick or a frame structure. The church to have seating capacity independent of aisles, chancel and organ-loft, of 800 or 900. The cost of church not to exceed $25,000.

The right is reserved to reject any or all plans, etc., that may be presented.

For that plan and specification that may be accepted $150 will be paid. For all further information address

REV. FATHER JACQUET,
608 P. O. Box 82, New Iberia, La.

PROPOSALS.

BRIDGE-PIERS.
[At Boston, Mass.]
OFFICE OF COMMISSIONERS HARVARD BRIDGE,
CITY-HALL, BOSTON, July 19, 1887.

Sealed proposals for building masonry piers for Harvard bridge over Charles River, between Boston and Cambridge, in accordance with form of contract and specifications, to be furnished by the City Engineer of the city of Boston, will be received by the Commissioners of Harvard Bridge at the Mayor's office, City-Hall, Boston, **until 12 o'clock, M., of Monday, August 15, 1887,** and at that time and place will be publicly opened and read.

Each proposal must be accompanied by a properly certified check for the sum of $1,000, payable to the order of the Commissioners of Harvard Bridge; said check to be forfeited to said Commissioners in case the bidder does not accept the award of the work to him.

The work will include from twenty to twenty-three ashlar masonry piers with pile foundations.

Plans can be seen and specifications and form of contract can be obtained at the office of the City Engineer, City-Hall, Boston, on and after Monday, August 1, 1887.

The Commissioners reserve the right to reject any or all bids should they deem it advisable to do so.

HUGH O'BRIEN,
WILLIAM E. RUSSELL,
LEANDER GREELY,
Commissioners of Harvard Bridge.
WALTER H. FRENCH,
606 Secretary.

HOSPITAL AND COTTAGES.
[At Quincy, Ill.]
OFFICE OF THE SECRETARY ILLINOIS SOLDIERS' AND SAILORS' HOME,
QUINCY, ILL., July 18, 1887.

Sealed proposals will be received at this office **until 2 P. M., on the 20th day of August, 1887,** for all labor and materials to build and complete a hospital and from three to twelve cottages for the Illinois Soldiers' and Sailors' Home located at Quincy, Ill.

Each proposal must be made on a printed form furnished by the Secretary, and must be accompanied by a certified check for $1,000, made payable to the Trustees of the Illinois Soldiers' and Sailors' Home.

The right to reject any or all bids is reserved.

The plans and specifications can be seen at this office after the 1st day of August, 1887.

S. B. SHERER,
Secretary.

SCHOOL-HOUSE.
[At Springfield, Mass.]
SPRINGFIELD, MASS., July 26, 1887.

Sealed proposals will be received by the Committee on City Property **until Friday, August 12, 1887, at 12 o'clock noon,** for building a school-house in Ward 5.

Plans and specifications for the same may be seen at the office of Richmond & Seabury, architects, Gill's Block, Rooms 7 and 8.

The Committee will receive separate bids for the mason, carpenter and plumbing work, or for all under one bid.

The Committee reserve the right to reject any or all bids. Per order of the Committee.

J. F. BIDWELL,
606 Chairman.

IRON STAIRS, ETC.
[At Moose Peak Light, Me.]
OFFICE OF LIGHT-HOUSE ENGINEER, FIRST AND SECOND DISTRICTS,
BOSTON, MASS., July 25, 1887.

Proposals will be received at this office **until 12 o'clock, noon, on Monday, the 15th day of August, 1887,** for furnishing complete the ironwork for tower stairs at Moose Peak Light Station, Me., and stair-railing for watch-room at Sankaty Head Light Station, Mass., in accordance with plans and specifications that may be seen upon application at this office.

The right is reserved to reject any or all bids and to waive any defects. W. S. STANTON,
Major of Engineers, U. S. A., Engineer 1st and 2d Light-House Districts, Room 142, Post-Office Building. 607

HOSPITAL REPAIRS.
[At Pensacola, Fla.]
NAVY DEPARTMENT, BUREAU OF MEDICINE AND SURGERY,
WASHINGTON, D. C., July 19, 1887.

Sealed proposals, endorsed "Proposals for Repairs at Naval Hospital, Pensacola, Fla.," will be received at the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., **until August 19, 1887, at 11 o'clock** A. M., when they will be publicly opened for repairs to Naval Hospital, Pensacola, Fla.

Blank proposals, specifications, etc., together with all necessary information, can be obtained on application to the medical officer in charge of the hospital.

F. M. GUNNELL,
607 Chief of Bureau.

HEATING, VENTILATION, ETC.
[At Marquette, Mich.]
MARQUETTE, MICH., July 20, 1887.

Sealed proposals for the heating and ventilation, new cell block, boiler stack, conduit, and water supply for the State House of Correction and branch of State Prison in the Upper Peninsula, at Marquette, under Act No. 346, 1887, are invited by the Board of Commissioners of said House of Correction and Prison **until Wednesday, August 24, 1887, at 3 o'clock** P. M.

Plans, specifications and instructions to bidders may be seen on and after July 23, 1887, at the office of the Commissioners, Marquette, and at the office of the architects, Scott & Co., 405 Wayne County Savings Bank Building, Detroit, Mich.

Proposals must be submitted separately for the heating and ventilation, cell block, conduit, boiler stack, and water supply, and the Board of Commissioners reserve the right to reject any or all bids.

Proposals must be submitted on the schedule blanks and accompanied by a copy of instructions to bidders, both of which will be furnished to intending bidders upon application to the secretary of the Board.

All bidders will be required to furnish bond and security or certified checks, payable to the order of the Board of Commissioners, equal in amount to five per cent of the bid submitted, which bond or certified check will be forfeited to the Board of Commissioners in the event of the failure or refusal of the bidder to enter into contract with the Board should his bid be accepted. All proposals must be sealed and indorsed, "Proposals for work on State House of Correction and Branch of State Prison, Upper Peninsula," and be addressed to the Board of Commissioners, Marquette, Mich.

For further information apply to the secretary of the Board at Marquette, Mich.

E. P. ROYCE,
President of Board of Commissioners for State House of Correction and Prison, Upper Peninsula.
Attest. GEORGE P. CUMMINGS,
608 Secretary.

UNITED STATES PENITENTIARY.
[At Salt Lake City, U. T.]
DEPARTMENT OF THE INTERIOR,
WASHINGTON, July 18, 1887.

Sealed proposals for furnishing the material and labor required in the construction of buildings in completion of the United States Penitentiary at Salt Lake City, Utah Territory, will be received at this Department **until 12 M., Monday, August 22, 1887,** when they will be opened in the presence of such bidders as may attend.

Plans and specifications, instructions to bidders, etc., may be seen at this Department and at the office of the Governor of the Territory at Salt Lake.

H. L. MULDROW,
606 Acting Secretary.

MASONRY RESERVOIR.
[At Nashville, Tenn.]

The Board of Public Works and Affairs of the city of Nashville, Tenn., will be prepared to receive bids **until 3 o'clock,** P. M., **Tuesday, August 9, 1887,** for the construction of a masonry reservoir of a capacity of 50,000,000 gallons, with the necessary influent

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effluent and gate wells, and other incidental work. Specifications and drawings can be seen at the office of the City Engineer.

By order of said Board. J. A. JOWETT,
606 City Engineer, Nashville, Tenn.

STEAM HEATING AND PLUMBING.
[At West Point, N. Y.]

War Department,
New York Depot of the Quartermaster's Department, Houston St., Corner Greene, New York City, July 12, 1887.

Sealed proposals, in triplicate, are invited and will be received at this office **until 11 A. M., August 22, 1887,** for the materials, work, etc., called for by specifications and plans for steam heating and plumbing, respectively, to be seen at this office and at the Post Quartermaster's office at West Point, N. Y.

The work is to be done on the new Gymnasium Building at West Point, N. Y.

Separate proposals are required for each of the specifications.

Blank forms of proposals, contracts, etc., can be had at this office and at West Point.

Bids must be made in strict conformity with the terms of the plans and specifications, and must be accompanied by a guarantee bond having justification for 20 per cent of the amount of the proposal, and a bond with a penalty of 10 per cent will be required upon execution of the contract.

The Government reserves the right to reject any or all proposals.

Envelopes containing proposals should be addressed to the undersigned and marked proposals for "Steam Heating," etc., as the case may be.

HENRY C. HODGES,
Lieut.-Col. and Deputy Q. M. General, U. S. A.,
Depot Quartermaster. 607

COURT-HOUSE.
[At Devil's Lake, D. T.]

Dated at Devil's Lake, Dakota, July 15, 1887.

Ramsey County, Dakota, will build a court-house and jail at Devil's Lake, Dakota, according to plans and specifications on file at the office of the County Clerk, Devil's Lake, Dakota, and at the office of the Pioneer Press, in St. Paul, Minn., after July 28.

Said court-house and jail to cost not to exceed the sum of Eighteen Thousand ($18,000) Dollars, and to be completed on or before the 1st day of December, A. D. 1887.

No proposals will be received unless accompanied by a certified check in the sum of $400 as a guarantee that the parties will enter into a contract with the Board for the construction of the buildings, and give a good and sufficient bond in the sum of Ten Thousand Dollars, with two or more sureties, conditioned that said buildings will be constructed according to plans and specifications, and be completed on or before December 1, 1887.

Bids will be received at the office of the County Clerk, Devil's Lake, D. T., **up to the 18th day of August, A. D., 1887,** and opened and passed upon by the Board at the hour of 2 o'clock p. m. of that day.

The County Commissioners reserve the right to reject any and all bids. JOHN A. PERCIVAL,
607 County Clerk.

WATER-TOWER.
[At Boston, Mass.]

Sealed proposals, addressed to the Boston Water Board and indorsed, "Proposals for Building a Water-Tower at Mt. Bellevue, Ward 23, Boston," will be received at the office of the Boston Water Board, City-Hall, Boston, **until 12 o'clock M., Tuesday, August 9, 1887,** and at that time and place will be publicly opened and read.

The prices proposed must be stated both in writing and in figures, and all proposals containing bids not called for in this advertisement will be considered informal.

Each bid must be signed by the bidder, and accompanied by a properly certified check for $1,000, payable to the City of Boston; said check to be returned to the bidder unless forfeited under the condition herein stipulated.

The amount and character of the securities for the fulfilment of the contract will be determined by the Boston Water Board after the proposals are opened.

If a bond is required with the contract, the sureties thereon must be residents of Massachusetts, and satisfactory to the Water Board.

Specifications and plans may be seen at the office of the City Architect, City-Hall, and the proposals are to be filled out on blank forms to be obtained at that office.

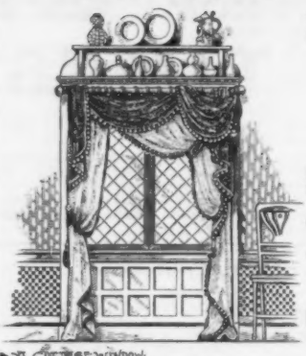
The Water Board reserves the right to reject any and all bids, should it deem it to be for the interest of the City of Boston so to do.

H. T. ROCKWELL,
606 Chairman Boston Water Board.

July 30, 1887. Sealed proposals will be received at the office of the Supervising Architect of the United States Treasury at Washington, D. C., and opened at 2 P. M. of the 25th day of August, 1887, for the heating apparatus for Post-Office, etc., at Syracuse, N. Y. Each proposal must be accompanied by a certified check for $500, made payable to the order of the Treasurer of the United States. The right to reject any bids is reserved. The plans and specification can be had and any information obtained, by applying to this office or the office of the Superintendent. WILL. A. FRERET, Supervising Architect. 606

July 30, 1887. Sealed proposals will be received at the office of the Supervising Architect of the United States Treasury at Washington, D. C., and opened at 2 P. M. of the 11th day of August, 1887, for the iron columns for the third story, iron beams and girders for the fourth floor, etc., for the Post-Office, etc., at Minneapolis, Minn. Each proposal must be accompanied by a certified check for $300, made payable to the order of the Treasurer of the United States. The right to reject any bids is reserved. The plans and specification can be had and any information obtained by applying to this office or the office of the Superintendent. WILL. A. FRERET, Supervising Architect. 606

PAPER HANGINGS.



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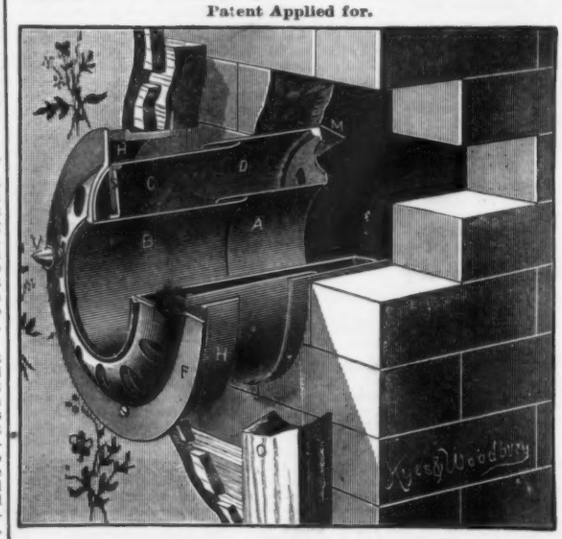

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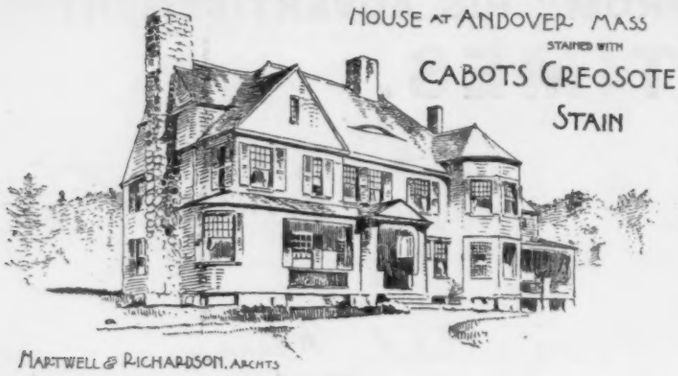

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